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ON ATHARVAVEDA 10,8,43b

By

J. A. B. VAN BUITENEN

puṇḍarīkaṁ návadvāraṃ tribhir guṇébhir ā́vṛtam/
tásmin yád yakṣáṃ ātmanvát tád vaí brahmavído viduḥ //

The interpretation of *b* has long been a bone of contention. It is agreed on all hands that the "lotus of nine doors" represents the human. i.e. male, body with the nine orifices, here especially of the cosmic Person. "Lotus" is a favourite mysterious name for the body of the Puruṣa (BĀUp. 2, 3, 6: *tasya haitasya puruṣasya rūpam .. yathā puṇḍarīkam;* Ch.Up. 8, 1,1 *atha yad idam asmin brahmapure daharaṃ puṇḍarīkaṃ veśma* etc.), associated with the sun (cf. ChUp 3, 1, 1 *asau vā āditya devamadhu* etc.), as well as with water (cf. our hymn AthV. 10, 8, 34, and lotus is a water-flower), and lies no doubt at the root of the popular conception of Brahmā's origination in the lotus on the navel of Viṣṇu (cf. MBh. 12, Cr. Ed. 175, 15 *tatas* tejomayaṃ divyaṃ padmaṃ *sṛṣṭam svayaṃbhuvā* etc.). So far there is no difficulty. Meanwhile we note that both terms *puṇḍarīka* and *navadvāra* are used metaphorically.

The crux is the meaning of *guṇa*. GARBE, in his edition of Sāṃkhyatattvakaumudī,[1] records previous explications and gives one of his own: "mit drei Schnüren (d. i. dreifach) umhüllt," this triple covering referring to skin, nails and hair. KEITH, *Sāṃkhya System*, p. 19, follows GARBE. Ultimately both follow BOETHLINGK-ROTH, s.v. *guṇa*, who explain *tribhir guṇebhir* as *triguṇa,* a rare usage of guṇa outside the numerical compound that is well attested, and render the clause "dreifach verhüllt". WHITNEY-LANMAN[2] explain that "the three guṇas [rendered "strands" in translation] are probably the three temperaments familiar under that name later; reference is to the three *doṣas* or humours, *vāta, pitta* and *kapha*. Both GARBE'S and WHITNEY-LANMAN'S translations give a purely physiological explanation, to which *navadvāra* may have led them. Prosaic explanations usually sound sensible; but the fact remains that their interpretations are wholly conjectural and in fact far-fetched. Besides, there is not really anything in the stanza or the hymn that favours physiology, not even *navadvāra*: the nine doors represent the organs and functions and objects of hearing, seeing, smelling, speaking,

1. Abh. Bayer. Ak. Wiss. XIX, p. 529.
2. *Atharva-Veda Saṃhitā*, II, p. 601.

and eating, impregnating and secreting, which all have a virtually metaphysical import in this age of thought.

Others are prepared to accept the three *guṇas* as "universal constituents" in a sense akin to that of Sāṃkhya etc. Within the entire cosmological context this interpretation is certainly more plausible, although the exact connotation of *guṇa* here will be difficult to establish. The best case has been presented by SENART,[3] whose remarks on *tantu/sūtra/guṇa* are persuasive. His interpretation of *āvṛtam*,[4] however, is less convincing. He compares AthV. 10, 2, 31-32, where it is said that "within the town of the gods with nine gates there is a golden divine flower-cup surrounded by light; this cup has three spokes on which it is thrice firmly established". (.. *návadvārā devā́nāṃ pū́r* .. *tásyāṃ hiraṇyáyaḥ kóśaḥ svargó jyótiṣā́vṛtaḥ// tásmin hiraṇyáye kóśe tryàre trípratiṣṭhite/ tásmin yád yakṣám ātmanvát* etc., as in 10, 8, 43; note again ChUp. 8, 1, 1 .. *daharaṃ puṇḍarīkam veśma, daharo 'sminn antarākāśa*, which inspired Mahānār Up. 10, 7; 11, 7). The comparison is indeed apt, but does not explain why in 10, 8, 43 the *puṇḍarīka* is covered by *guṇas*, which is different from being surrounded by light or firmly fixed on three spokes.

I may quote another parallel from a Mokṣadharma text, which, I think, hails from the same milieu of thinkers as our AthV. passages; 12,210 reads

uṣṇīṣavān yathā vastrair tribhir bhavati saṃvṛtaḥ/
saṃvṛto 'yaṃ tathā dehī sattvarājasatāmasair//12//

The next line declares that these *guṇas*, styled *hetu* "cause, starting-point", surround the tetrad:

tasmāc catuṣṭayaṃ vedyam etair hetubhiḥ āvṛtam.

This tetrad cannot be identified with the four conditions, waking, dreaming, dreamless sleep and *turīya*, of the MāṇḍUp.2-7, which is at the basis of Nīlakaṇṭha's interpretation (ad ib., 1, with advaitic variants[5]) followed by DEUSSEN-STRAUSS[6]. For one thing, the *turīya* at least is definitely beyond the *guṇas*. We may connect[7] the epical *catuṣṭaya* with the *catuṣ-*

3. *Rajas et la théorie indienne de trois guṇas*, J. As. 1915, p. 151 ff.
4. *āvṛtam* was KEITH's main difficulty: "if the reference is to be taken as to the constituents in the sense of the Guṇas of the Sāṃkhya philosophy, it is clear that the expression is inaccurate, since the three constituents make up nature, and the passage would say that the body was covered with nature, instead of consisting of nature," Sāṃkhya System, p. 19.
5. *catuṣṭayaṃ pūrvoktaṃ dṛṣṭāntabhūtaṃ svapnasuṣuptyākhyaṃ dvayaṃ dārṣṭāntikaṃ ca saguṇanirguṇabrahmabhāvākhyaṃ dvayam iti catuṣṭayam*, (Poona ed.).
6. *Vier philosophische Texte des Mahābhāratam*, (Leipsic 1906), p. 266-267.
7. As I think we must: the *catuṣpād* of AthV. 10, 8, 21 should be distinguished from the four quarters (three hidden, one revealed) of RV. 1, 164, 45; 10, 90, 3-4; AthV. 2, 1, 2 (the four conditions of MāṇḍUp. 2-7, three metempirical, one empirical, are akin), and connected with the four quarters of ChUp. 3 and 4 as

pād of our hymn (10, 8, 21) in the creation myth where the Person, originally without quarters, becomes *catuṣpād* "having four quarters", when he has created the bright sky; the meaning of *catuṣṭaya* is apparently "four components of the universe", earth, atmosphere, sea and sky (ChUp. 4, 6,3), or the four quarters of the sky (ChUp. 4, 5, 2; cf. also 4, 7, 3; 4, 8, 3; 3, 18,.2 has *vāk/agni; prāṇa/vāyu; cakṣuḥ/āditya; śrotra/diśaḥ*), etc. *Catuṣṭaya* in these senses would be strictly subject to *guṇas*.

There are other reminiscences and correspondences in a series of comparisons: the three-spoked *kośa*, in the eight-wheeled town of the gods (AthV. 10,2,31 and 10,8,43):

etāvad etadvijñānam etad asti ca nāsti ca/
tṛṣṇābaddhaṃ jagat sarvaṃ cakravat parivartate //32//

both the lotus and the *tantu*:

bisatantur yathāyam antasthaḥ sarvato bise/
tṛṣṇātantur anādyantas tathā dehagataḥ sadā //33//

the *sūtra* on which in AthV. 10,8,37[8] all is strung:

sūcyā sūtraṃ yathā vastre saṃsārayati vāyakaḥ/
tadvat saṃsārasūtraṃ hi tṛṣṇāsūcyā nibaddhyate//34//

It is clear that old metaphors and images are here reinterpreted in the terms of the more recent conception of *tṛṣṇā*.

We should not forget that originally *guṇa* as a universal component or constituent was also a metaphor: "strand", three of which are required to twine a rope, or plait a tress. The three-piece turban may quite plausibly also have been an ancient comparison for the *guṇas*: threads and cloth will remain associated with the *guṇas* throughout the philosophical literature, especially threads and clothes of different colours, which are rudiments of the three *rūpas* of ChUp. 6, 4 and SvetUp. 4, 5.[9] I think we have good reason to believe that the three pieces tied into one turban were also of different colours. As is well-known, the

quoted; although in 4 each quarter is again in divided into four, it is clear from 3, 18, 2 that this is a device to account for 3 rival macrocosmic tetrads and, 1 microcosmic one simultaneously. Meanwhile, to complicate matters, it would seem that the *catuṣṭaya* of MBh. 12, 210, 1 (*na sa veda paraṃ brahma yo na veda catuṣṭayam*) is different from that of st. 13 (S 12, 197, 199 and Cr. Ed. read *dharmam* for *brahma*); but the first half-śloka, 1 ab, stands completely isolated, and I take it that it is interpolated (from a marginal gloss just on *catuṣṭaya* in 13? It reads like a quotation); 1 cd is evidently a make-shift.

8. *yo vidyāt sūtraṃ vitataṃ yasminn otāḥ prajā imāḥ/sūtraṃ sūtrasya yo vidyāt sa vidyād brāhmaṇaṃ mahat.*

9. *lohita, śukla* and *kṛṣṇa*, corresponding resp. to the sun, the waters (i.e. rain from the clouds) and food (i.e. the wet soil in the rainy season when the sowing is done); later on the order was: white—*sattva* ("bright"); red—*rajas* (on account of its constant association with *rāga*, which forced not only the meaning of "passion" but also of "redness" on *rajas*); and black—*tamas*. The *rūpāṇi*

turban is a wrapping of one long piece (up to six yards) of cloth. On inquiry I found that in certain parts of India, esp. Gujarāt, three pieces of cloth are occasionally tied into one turban, always three and always of different colours, called *pāghḍī* in Surat.[10] Does the epic author refer to some such fashion of turban? Another[11] interpretation is possible: a man with a turban is wrapped in three cloths: turban-cloth, upper-cloth and under-cloth. In any case, the comparison may well point to a natural explanation of *tribhir guṇebhir āvṛtam*: the Puruṣa's cosmic body, likened to a lotus, with its nine orifices, likened to doors, is wrapped in its components, as if wrapped in a three-piece turban, or a three-piece dress. We have a delightful vision of the three *guṇas* tied into a gaudy turban on the head of the cosmic Puruṣa. But this after all is the kind of naturalistic imagery in which the ancient thinkers and poets themselves delighted.

of ChUp. 6, 4 are almost invariably explained by Indian commentators to refer, not to the guṇas, but the 5 elements. The only passage I have come across where the connexion with the guṇas is recognized is MBh. 12, 302, 46, where *rūpāṇi* shows that the author refers to ChUp., not to SvetUp.

10. From Dr. H. D. Sankalia of the Deccan College.
11. Deussen-Strauss prefer the three-piece turban: "gleichwie einer, der einen Turban tragt, sein Haupt mit drei Tuchstreifen umwickelt, etc".

NORTH-WESTERN (AND WESTERN) INFLUENCE ON THE VERSIONS OF ASOKA'S MINOR ROCK EDICT

By

M. A. MEHENDALE.

In a paper contributed to the Sārdhaśatābdi Commemoration Volume of the Bombay Branch of Royal Asiatic Society I have already shown that there are certain linguistic features in the Mysore versions of Aśoka's minor rock edict in which it is possible to detect the north-western (and western) influence. The reason for this influence as suggested in that paper was that the edict was probably issued from the north-west and then translated into the west-central dialect before it was inscribed at three places in the Mysore State. It was also found that these versions gave certain eastern characteristics, especially in morphology, and it was demonstrated that these eastern features owed their presence in the minor rock edict either to the fact that at the time when the minor rock edict was issued from the north-west some of these eastern features were already known there owing to the presence of some 'Māgadhisms' in the north-western (particularly the Mānsehrā) versions of the major rock edicts, or to the fact that the edict was dictated by the Māgadha king himself who spoke an eastern dialect.

In the present paper I intend to corroborate the above view regarding the issue of the minor rock edict from the north-west by further referring to those points in which the remaining six versions of the minor edict[1] viz. those found at Sahasrām (s)[2] in south Bihar, Bairāṭ (b)

1. For the text and translation of the versions at Rūpnāth, Sahasrām, Bairāṭ, and Maski, see E. HULTZSCH, *Inscriptions of Aśoka*, Oxford, 1925, pp. 166-72, 174-75. For the Kopbāḷ versions, see R. L. TURNER, *The Gavīmaṭh and Pālkīguṇḍu Inscriptions of Aśoka*, Hyderabad Arch. Ser. No. 10, Calcutta, 1932, and for the Yerraguḍi version, B. M. BARUA, *IHQ* 13.132-36 (1937). For all these versions also see J. BLOCH, *Les Inscriptions d'Asoka*, Paris (1950), pp. 145-51.
2. Besides the abbreviations indicated here, the following are also used in this paper:—
   D—Dhauli version of the Major rock edicts.
   J—Jaugaḍa version of the Major rock editcs.
   S—Shāhbāzgaṛhī version of the Major rock edicts.
   M—Mānsehrā version of the Major rock edicts.
   G—Girnār version of the Major rock edicts.
   K—Kālsī version of the Major rock edicts.
   d—Dhauli version of the separate edicts.
   j—Jaugaḍa version of the separate edicts.

in the Jaipur State, Rūpnāth (ru) in the Madhya Pradesh, Maski (mk) and Kopbāḷ (kpb) in the south Hyderabad State, and Yerraguḍi (yr) in the Kurnool district of the Andhra State, show the non-eastern influence in their language. Unlike the Mysore versions, these six versions are found at places far away from each other[3] and hence they are not quite identical in their text and language. In the first instance we have to note that the Sahasrām version, which is in the east, was translated into the eastern dialect;[4] the Bairāṭ version is more or less in agreement with it and thus it shows the extent of the influence of the Māgadhan dialect. The other versions on the other hand are more or less free from the eastern influence in Phonology and show adherence to the non-eastern forms. Since many of the important points as to what may be considered eastern and what non-eastern have been already discussed and the reasons why eastern features are found in the minor rock edict have been stated, these considerations will not be repeated here. The correspondences of the non-eastern forms occurring in the minor rock edict with those in the Niya Prakrit, the later Kharoṣṭhī inscriptions and the literary Prakrits have also been pointed out in the paper on the Mysore version referred to above. It will be sufficient in this paper here to show the regional distinctions which occur in the remaining versions of the minor rock edict. However, I have referred to in the foot-notes for the sake of comparison certain forms occurring in the Bhaṭṭiprōḷu inscription in which LUEDERS has observed a north-western characteristic.[5]

One thing may be noted regarding the contents of the versions. While most of the versions end with the declaration that the edict was issued while the king was on tour, and that he had been on tour for 256 nights, only the Mysore and the Yerraguḍi versions add to it some more matter describing what the king considered to be the *dhaṁmaguṇā*. Even with regard to this additional passage the Yerraguḍi version is more extensive than the Mysore version. Unfortunately the Yerraguḍi version is not well-preserved and hence it has not been fully explained.

br—Brahmagiri version of the minor rock edict.
sd—Siddāpur version of the minor rock edict.
MRE—The versions of the Minor Rock Edict.

3. Only the Gavīmaṭh and the Pālkīguṇḍu versions at Kopbāḷ are near to each other and are identical in contents. The Pālkīguṇḍu version, however, is much damaged.

4. The s version shows only the following few non-eastern features which it has allowed to remain from the original draft. These are—*diyaḍhiya*, *savachala*, *pāvatave*, and *palakamamīna* which are discussed below.

5. On the basis of the distinction made in the sibilants ṣ and s in the Bhaṭṭiprōḷu inscription, LUEDERS (*Philologica Indica*, p. 217), observes—Ich bin daher geneigt, den Dialekt von Bhaṭṭiprōḷu diesen Dialekten anzugliedern und in den Leuten, die den Stūpa errichteten, Kolonisten aus dem Nordwestern zu sehen."

There is one more point in which the Yerragudi version differs from the others. While all the other versions are written from left to right, the Yerragudi version, though written in Brāhmī, shows certain lines being inscribed from right to left as was the custom for the Kharoṣṭhī script used in the north-west.[6] While commenting on this state of affairs, BARUA (*IHQ* 9.114-15, 1953) observes, "The anamoly in the engraving of the inscription might be partly due to the fact that the scribe entrusted with the work was inefficient and careless, and partly due to the fact that he was so much habituated to writing the Kharoṣṭhī form of writing from right to left that it was very difficult, nay, impossible for him to shake it off even in writing a Brāhmī inscription." But this is a little difficult to admit, because there is at least some consistency in writing almost always the even lines from right to left, and it would be much better to explain the confusion as arising from the fact that it reflected an attempt on the part of the scribe to combine the two ways in which the Brāhmī and the Kharoṣṭhī scripts were written—the former because he was actually writing the edict in that script, and the latter because the original draft was written in that script. This is a small piece of palaeographic evidence to show that the original draft was issued from the north-west. (For another possible palaeographic evidence, see below p. 94 footnote 58).

Two announcements have been made in recent times regarding the discovery of two more versions of the minor rock edict—the one at Rajula-Nandagiri near Pattikonda in the Kurnool district[7] (the find-spot is only twenty miles from Yerragudi), and the other in a forest near the village Gujarra in the Datia district, Vindhya Pradesh.[8] Both these versions have not been yet published and hence they are not treated in this paper. When published, these versions would be of great help either to support or alter some of the observations made in these two papers on Aśoka's minor rock edict.

With these introductory remarks I proceed to show the north-western (or western) characteristics found in the different versions.

(1) The vowel *ṛ* : In these versions there are not many words with *ṛ* which express human relationship. The only available instance is *-pitu-* (*pitṛ*) occurring in yr version, and it shows the north-western

6. I have already pointed out in my paper on the Mysore versions that the last word in that version, viz. *lipikareṇa* is written in the Kharoṣṭhī alphabet and that this is one of the facts pointing to the north-western origin of the edict.

7. Indian Archaeology 1953-54. A Review, New Delhi, 1954.

8. "The Times of India", 10th December, 1954.

treatment[9] $\underset{\circ}{r} > u$ observed in this class of words, and not the corresponding eastern $\underset{\circ}{r} > i$ treatment. cf. *pitu* and *bhratu* in S, M, as against *piti* and *bhāti* in D,J.

(2) The vowel *e* : In a few cases the vowel *-e* tends to become *-i* in the north-west.[10] cf. *duv[i]* for *duve* (*dve*), *aṁñi* for *aṁñe* (*anya*), *rajani* for *rajane* (*rājānaḥ*). Now a similar change may be observed also in kpb in the instance *upeti* for *upete* (*upetaḥ*),[11] and in ru in *pavatisu*[12] for *pavatesu* (*parvateṣu*).

(3) The vowel *a* : With the above tendency may be compared the north-western tendency to change $a > i$ in certain instances.[13] For example, *ayi* (*ayam*) in S, M, *vinikramaṇi* M (= *vikramaṇaṁ* S). Now with this compare *bāḍhi* (*bāḍham*) in ru[14] (but *bāḍhaṁ* and *bāḍha* in the other versions). Here we may also consider the forms of the demonstrative pronoun *etad*, which in some instances in the north-west gives the base *eti*-[15] for the usual *eta*-. cf. *etisa* in S, M (*etiṣā* in K), but *etasa*

9. Also cf. the following words in the Bhaṭṭiprōlu inscriptions (references to *Philologica Indica*) : *sapitukasa* p. 218, *kurapituno* and *kuramatu* p. 220, *mātugāmasa* p. 221.

10. For similar tendency in the Niya Pkt., cf. *nici* = *nice*, *vaṁti* = *upāṁte*, T. BURROW, *The Language of the Kharoṣṭhī Documents from Chinese Turkestan*, (Cambridge, 1937) § 1. BURROW also notes that the change was regular in the dialect of Khotan and that similar instances are common in the Kharoṣṭhī Dhammapada. In the Bhaṭṭiprōlu inscription too we have *kubira* for *kubera*, p. 229 (which, in the form *kupira*, occurs also in a Bharaut inscription, see LUEDERS' List No. 794).

11. Among other versions, ru has *upete*, b *upayāte*, br and sd *upayīte*, yr *upayite*, and mk *upagate* (see below p. 86).

12. HULTZSCH, p. cxxvi and f.n. 1 takes this as the loc. pl. of the fem. base *pavati* (*parvati*) which is unlikely. cf. *pavatesu* in the s version. Similar change of $-e > -i$ in Pāli is noted by LUEDERS, *Beobachtungen* etc., § 10, (p. 17) and f.n.3, cf. *dāni* for *dāne* (*dānaṁ*). With *pavatisu* may be compared Pāli *hemantagimhisu* (*hemantagrīṣmeṣu*) cited by LUEDERS.

13. Among later Kharoṣṭhī inscriptions we find *śati* (*śata*) and *sarviṇa* (*sarva*–), cf. M. A. MEHENDALE, *Historical Grammar of Inscriptional Prakrits*, (Poona, 1948), § 503. Among later Pkts, change $a > i$ is found in Māhār., Amg., and JM; but Ś and Mg. preserve *a*, PISCHEL § 101.

14. *pakamasi* for *pakamasa* in ru and *kaṭiviya* for *kaṭaviya* in br may be regarded as scribal mistakes.

15. For *etiṇa* occurring in the Khar. Dhammapada, see BURROW § 1. Pāli has also base *ti* and *eti* in fem., cf. *tissā*, *tissāya*, *tissaṁ*, *etissāya*, GEIGER § 105. Among later Pkts. M, JM, Amg. and P have bases in *–ā* and *–ī* in fem., but Mg. and Ś have in *–ā*, PISCHEL § 424, § 426. Delhi-Topra pillar edict has *kinasu* (< *kenasvit*) but Sārnāth has *kenapi*. For the base *ki–* in the forms of the interrogative pronoun in Pāli see GEIGER § 111, and in later Prakrits cf. PISCHEL § 428. In gen. the form *kiśa* appears also in the eastern Pkt. Māgadhī. *kiṁna*, instr. in form, has been noted by BURROW § 83 for Niya Prakrit.

in d, j, G. Among the versions of the minor rock edict, ru gives the base *eti-* twice, cf. *etinā* (instr.) and *etiya* (dat.). Similarly though *idam* gives forms with the normal base *ima-*, it also shows non-eastern *imi-*[16] in *imisa* S and *iminā* G. With this we may compare *iminā* in br, sd, and yr among MRE.

The change $a > i$ is also noticed in the non-eastern versions of MRE in the future ending *-siti* which varies with the eastern ending *-sati* (*-syati*). This change may be explained as palatalisation of the vowel.[17] Thus we have *vaḍhisiti* ru,[18] mk, kpb, yr, br, sd, but *vaḍhisati* s, b. Now in S we have the future ending *-śati* in forms like *vaḍhiśati* etc. where the vowel *a* is preserved due to eastern influence, but the palatalisation is even then seen in the sibilant $s > ś$. The vocalic change $a > i$ in the future ending may thus be regarded as a north-western characteristic.[19]

(4) The vowel *u* : In yr we get the non-eastern form *garu* (*guru*) with the vowel *a* (which was also found in the Mysore versions). cf.

16. Pāli has *iminā* (and *aminā*) in mas. and *imissā* and *imissaṁ* in fem., GEIGER § 108. JM, Ś, and Mg. have *iminā*, PISCHEL § 430. BLOCH, op. cit. p. 69 observes—"Ces formes à *i* intérieur (i.e. forms *imissa*, *imissā* and *iminā*), auxquelles il faut joindre dans l'autre démonstratif gén. sg. Sh. M. K. *etissa* et Rup. instr. *etinā* (mais dans Rup. *ctiya atthāya* datif, le premier mot doit être une graphie ou une lecture fautive pour *etāya*) reposent sans doute sur l'interrogatif, où le thème *ki-* du neutre s'est étendu au delà de son domaine primitif." This is, however, unlikely, for the variation *a* : *i* shows geographical distinction and should be related to the north-western tendency to change *a* to *i* as shown above.
17. For a similar change of $a > i$ in the presence of *y*, cf. *muli* 'price', *eśvari* 'ownership' and *arogi* 'health' in the Niya Prakrit, cf. BURROW § 9. For future, BURROW § 99 gives both the endings *–iṣyati* and *–iśati*. Pāli has sometimes *i* for *a* in the future ending when *h* appears for *s* in the Gāthā dialect, cf. *karihiti* for *karissati* etc. GEIGER § 150, § 151, § 153. Among later Prakrits, Māh., JM and Amg. have similar endings with *i* vowel, besides the usual endings with the *a* vowel: *–ihisi* and *–ihii* or *–ihī*. Hemacandra (4.275) gives *–issidi* for Śaurasenī as well. According to the same grammarian (4.302) the same ending seems to have extended even to Māgadhī in *bhaviśśidi* (PISCHEL § 520).
18. In ru once we have *vaḍhisata* which is to be read as *vaḍhisiti*, HULTZSCH, p. 167, f.n. 8.
19. The form *vadhisiti* is regarded as eastern by TURNER, *BSOS* 6.532 (1931). This does not seem to be justified in the first instance because the tendency to change *a* to *i* is found in the north-west, and secondly because among the versions of the minor rock edict, the one at s (and b) which can be regarded as eastern gives *vaḍhisati* and not *–siti*. The form *likhiyisāmi* occurring in D XIV 2 does not show the change $ayi > iyi$ as TURNER (op. cit., p. 532, and also HULTZSCH, p. xcix) would take it to be, but it is obviously influenced by *likhite* which immediately precedes it, cf. *bahuke ca likhite likhiyis[āmi]*. Similarly *vadhiyisati* of K (IV. 11) is either influenced by *vadhite* which precedes it, or like *vaḍhiyati*, which also occurs in K, it may be due to confusion with the future base *vaḍhi-* in *vaḍhisati*,

garu G, S (and *galu* K), but *gulu* D, J; (*guru* occurs in G, S, M also as a borrowing).

(5) The semi-vowel *y* : As in the case of the other non-eastern versions, the semi-vowel *y* is preserved initially in the forms of the relative pronoun and in the indeclinables cf. *yathā* ru, *yathāraha* (*yathārha*) yr, *ya* or *yaṁ* (*yat*) ru, b (line 2), kpb, yr, *yārisa* (*yādṛśa*) yr. But the eastern s version gives *aṁ* with the loss of initial *y*.[20] *aṁ* occurs also once in b in line 3. What is surprising is to find *aṁ* in mk and *athā* in yr. It appears therefore that the original draft contained these forms because instances like *e*, *aṁ* and *atha* were already known in the north-west due to their occurrence in the M version.[21]

As in the Mysore version, we have *y* developed before *i* in *upayita* (*upa+ita*) in yr. The form *upayāta* in b is a mistake for *upayita*.[22] An analogical extension of this phenomenon in a compound form when the first member ended in *i* was noticed in *diyaḍhiya* (*dvi+ardha*) while dealing with the Mysore version. The same form occurs in all the remaining versions, including s and b. Another instance of this nature is *hathiyāroha* (*hasti+āroha*) in yr.

The optative endings *-yu*: *-vu*: The yr version gives the eastern opt. 3rd pl. ending *-vu* as against the non-eastern *-yu* given by the Mysore version, cf. *parākamevu*[23] and *jānevu* (for *pakameyu* and *jāneyu*). This will show that the original draft had the ending *-vu* under the eastern

20. This loss in the eastern versions is not regarded by Bloch (l.c. p. 52) and J. Vekerdi (*AO* 3.324.1953) as a phonetic phenomenon, because *y* is not initially lost in the eastern versions in substantives and verb forms like *yuta*, *yāti* etc. But in my opinion the phenomenon is so regular that perhaps it would be better to assume that the literary dialect has carried to the extreme the tendency which had appeared in the pronunciation of certain indeclinables and forms of the relative pronoun because they were of frequent occurrence in the speech.
21. A few other eastern forms like *ava* (*yāvat*) are found at S also.
22. Of course it is possible to derive *upayāta* from √*yā*. Compare, for instance, that the western G version uses √*yā* or √*niyā*, where the eastern and under its influence the north-western versions use √*nikhama* (or √*nikrama*) in the third and the eighth rock edicts (√*nikhama* occurs in d, j also. The form *ayāya* in G VIII, can as well be derived from √*i*, cf. Hultzsch, p. lxviii, but cf. Bloch, op. cit., p. 75). In the thirteenth rock edict, however, K and M versions have √*yā*, and S has √*vraca* (G version is missing). In the same edict, as noun form *vinikhamaṇa*, occurs in G also (K has *vinikhamana*, S *nikramaṇa*, and M *vinikramaṇa*). But so far as the versions of the MRE are concerned note the use of the verb √*i* in the form *upeta* in kpb and ru. Perhaps *upayāta* may represent an attempt on the part of the scribe to correct the form *upayita* of the original draft as it was not properly understood. The form *upeta* noticed above and *upagata* in mk point to the same inference.
23. Also see below p. 95 where even the base *palākama* is shown to be eastern.

influence. This was rightly altered in the Mysore version in keeping with the western forms, but allowed to remain in the yr version.

(6) Treatment of *r* : *l* : As is to be expected the eastern s version gives the forms with *l*, and in this respect the b version also agrees with it. cf. *udāla* (*udāra*), *cila* (*cira*), etc. As against this, the kpb and the yr versions agree with the non-eastern treatment and show *r*. cf. *udārā*, *cira*, etc. The ru version in Central India, however, gives forms with *r* as well as *l* : *sātireka*,[24] *ārādhe[ta]va*[25] (*ā√rādh-*), *cira*, and *savachara*, but also *sātileka*, *udāla*, *√palakama* (*parā√kram*), *apaladhiya* (*aparārdhya* ?), *ahāla* (*āhāra*), *vālata* (*vārataḥ*). The mk version, which is further in the south, is allowed to be more free from the eastern influence in this regard. Cf. .... *[t]ire* .., *pure*, but *kalaṁta*[26] (*√kar*), *udālaka*. This state of affairs shows that the eastern speech habit to use *l* was known very much outside its home so that the scribes who worked for the ru and mk versions thought it proper to use some forms with *l* to show familiarity with the king's speech. Moreover, it is also possible that the original draft contained some of these words with *l* as a result of the influence of the king's speech.[27] While these were completely altered in some versions, it was only partly done in the others.

(7) Sibilants : As in the standard western Prakrit, the versions of the minor rock edict have only the dental sibilant in a large majority of cases. But as the north-western dialect shows distinction between the three sibilants we have at least one instance of the palatal *ś* in *Śaka* (*Śākya*), and one instance of the cerebral *ṣ* in *vaṣa* (*varṣa*), both in mk.[28] In b, the palatal *ś* is found in an attempt at hyper-north-westernisation in *śvaga* (*svarga*), exactly as we have *śaca* (*satya*), *śava* (*sarva*), and *ācariyaśa* (*ācāryasya*) in the Mysore version.

(8) Cerebralisation : The cerebralisation of dentals is particularly an eastern characteristic. But instances of cerebralisation are found in many forms in the north-west also and hence such cases can be witnessed in the versions of the minor rock edict. Thus for *t* > *ṭ*,[29] cf.

24. BUEHLER and SENART read *sātileka*, cf. HULTZSCH, p. 166, f.n. 1.
25. TURNER, loc. cit., p. 8, would read *ālādhetava–*; *āladhi* and *√ālādha–* occur already in the K version in the north.
26. *Kalaṁta* occurs in K as well.
27. Some Magadhisms showing *l* for *r* have been well known in S, M, and G versions also.
28. BLOCH (op. cit., p. 48) regads these cases as scribal errors and considers that they do not represent the actual pronunciation. True, they do not reflect the pronunciation of the west or central dialect but surely they point to the distinction maintained in the original draft which came from the north-west.
29. The western dental, however, can be seen in *pavatitaviya* (*pravartitavya*) and *pakiti* (*prakṛti*) in yr.

kaṭa (*kṛta*) s, ru, kpb, and *kaṭaviya* (*kartavya*) yr; for *th* > *ṭh*, cf. *aṭha* (*artha*) s, ru, kpb, yr; for *d* < *ḍ* cf. *uḍāra* kpb, *uḍāla*[30] s, b, ru mk, *khuḍaka*[31] kpb; for *rdh* > *ḍh*, cf. *diyaḍhiya*, *aḍhătiya* (*ardhatrika*), and √*vaḍha* (√*vardh*) which occur in all versions; for *st* > *ṭh*, cf. *ṭhabha* (*stambha*) ru, but *thaṁbha* s; for *sth* > *ṭh*, cf. *ṭhitika* (*sthiti*) in all versions · Now with regard to *st* it is to be observed that *thaṁbha* is the eastern form, as *st* > *th* in D, J, K and also M, while *ṭhaṁbha* is the west-central form, as *st* remains or becomes *sṭ* in G, which latter may have been further assimilated to *ṭh* in the west-central dialect. With regard to *ṭhitika*, it may be noted that this form with the cerebral is the eastern one (as *sth* > *ṣṭh* in the forms of √*sthā*) and it occurs in the minor rock edict as it was already known in the north-west through the M version.[32] It may be added that perhaps in mk we have *uṭhāna* (*utsthāna*) while *uṭhana* is found in S, M also.

For *vyuṣṭa* we have *vyuṭha* in ru and *vyūṭha*[33] in yr as quite regular forms. The s version, on the other hand, gives the eastern form *vivutha*.[34] It appears that *vyūṭha* and *vivutha* came from two different bases derived from *vi*√*vas*-, the former from *vi* + **uṣṭa*[35] and the latter from *vi* + **vasta*.[36]

The treatment of *ṇ* : *n* : It is well known that *n* is eastern and *ṇ* non-eastern. Now among the versions of the minor rock edict, we have *ṇ* in kpb, (as also in the Mysore version), but all others give the eastern *n* : *sāvana* (*śrāvaṇa*) ru, s, yr,[37] *porānā* (**paurāṇā*), *guna* (*guṇa*), and *prāna* (*prāṇa*) in yr. But we have *sāvaṇa*, etc., in kpb. In terminations, all versions have only *n*, but kpb (and the Mysore version) has

30. This form is not known in the north-west so far as the Aśokan inscriptions go. Its appearance can be explained only as emanating from the king's speech.
31. The cerebral in this word is clearly due to the influence of the cerebral in *uḍāra*, cf. *khuḍakā ca uḍārā ca pakamaṁtu ti*.
32. Bhaṭṭiprōlu has *ṣṭh* > *ṭh* in *goṭhī* (*goṣṭhī*), but once *th* in *gothi*, cf. Phil. Ind. p. 224, 226, 229, and 225; also cf. *kāṇiṭha* (*kaniṣṭha*), p. 220.
33. This is the reading of BARUA; BLOCH reads *vyutha*. Bhaṭṭiprōlu also has *ṭh* in *yaṭhi* (Phil. Ind. p. 221).
34. It has been already shown in the paper dealing with the Mysore versions that we have eastern *v* for the non-eastern *y*; also cf. above p. 86.
35. The forms *diyaḍhiya* etc. above p. 86 would suggest that the north-western form should be *viyuṭha* with the development of *y* after *i*. The preservation of the cluster *vy* shows the western influence, cf. below p. 89.
36. With this cf. later Māhārāṣṭrī *vuttha* and Jain Māh. *pavuttha*, PISCHEL § 303. *vivutha* could as well come from *vi* + **uṣṭa* and correspond exactly to **viyuṭha* of the north-west (cf. the above f.n.); but as this is made difficult by the absence of the cerebral in *vivutha*, I am inclined to look upon *vivutha* as a mistake for *vivuṭha*, just as *vyūtha* in the Mysore version has been suggested in the previous paper to be a mistake for *vyūṭha*.
37. yr once gives *sāvaṇa* also,

sometimes *ṇ*: *sātirekāni* ru, but *sātirekāṇi* kpb, *aḍhātiyāni* s, ru, mk, but *aḍhatiyāṇi* kpb.[38] The kpb version thus not only preserves *ṇ*, but also changes *n*>*ṇ* (this, however, is not done in the Mysore version): *munisa* s, yr, but *māṇusa*[39] kpb, √*jāna* s, b, ru, yr, but √*jāṇa* kpb; *devānaṁ* ru etc., but *devāṇaṁ* kpb; also cf. *dāṇi* (*idānīm*) and even initial *ṇ* in *ṇo* (*no*)[40] in kpb.

(9) Consonant clusters with *y*: They are in most cases assimilated as in the north-west and the west. In two cases the cluster is preserved as is also the tendency observed in the west. It is assimilated in *Śaka* (*Śākya*) mk, *saka* (*śakya*) mk, *āroka* (*ārogya*)[11] yr. It is preserved in [*ca*]*kya* (*śakya*) b (line 6) and *yūgya* (?) yr. The eastern influence of dissolution is seen in *sakiya* yr, ru, and *cakiya* kpb, s, b (line 3), *ācariya* (*ācārya*) yr. It may also be found in *rdhy* > *dhiy*, cf. *aparārdhya*[41] > *avaladhiya* s, *apaladhiya* ru, *aparadhiya* yr. These forms show that the original draft had the eastern forms *cakiya*, *ācariya*, and *avaladhiya*. While translating into the western dialect, they were partly westernised by changing *caka* > *saka* and *l* > *r*, but the eastern dissolution was retained.

The cluster *vy* is preserved in the instance *vyūtha* in ru and yr versions as in the west. It is dissolved in ru in the instance *vayajana* for *viyajana*[42] (*vyañjana*). In s we have *vivutha* (*vyuṣṭa* or **vivasta* see above p. 88 and f.n. 36). In future participles, the non-eastern tendency of assimilation is seen in *pāpotava* ru, kpb, *adhigatava* mk, *ārādhetava* yr (the only instance with -*v*- in yr; otherwise we have -*viy*-), and *ālādhetava* b. In the form of this word as also in *pāvatava*[43] even the s version adheres to the original in so far as the ending is concerned. The eastern tendency of dissolution is seen in *dakhitaviya* mk, *vataviya* mk,

38. According to TURNER (op. cit., Text) kpb gives *ṇ* in the terminations also in *vasāṇi* and *mahateṇa*. But in these two cases as well as in *aḍhātiyāṇi* I would read the dental -*n*- in the endings. Even according to TURNER'S reading kpb gives dental in *khudakena* and *pakamamiṇena*.

39. This is according to TURNER. I would read *mānusa*. There is no place for the upper horizontal stroke of *ṇ* between the *ā* stroke of the first letter *mā* and the *e* stroke of the third letter *se* in *māṇusehi* (line 4).

40. Here also I differ from TURNER and read *no* both in line 2 and line 4. The estampage and the photograph given by him show slight variation in the symbol which he reads as *ṇo*. If the left middle horizontal stroke seen on the estampage is due to chance erasure and that the slight upper right hand stroke is an accidental extension of the left hand mark, then the symbol can stand for *no*. In line 4, we see a symbol which clearly shows that the left hand upper horizontal stroke is a matter of chance occurrence and has no value in reading the symbol as it is separated from the main letter.

41. I intend to show in a separate paper that this derivation is incorrect.

42. BLOCH (op. cit., p. 150, f.n. 13) regards these as scribal errors.

likhāpetavaya (for *-taviya*) and *vivāsetaviya* ru, and *susūsitaviya* yr. Now the eastern tendency of dissolving the cluster was already known in the north-west in such instances as *viyapaṭa* or *viyapraṭa* (*vyāpṛta*), and especially in the endings of the future passive participles, cf. *pujetaviya, kaṭaviya* etc.

(10) Clusters with *r* : Such clusters are normally assimilated, cf. *pakata* or *pakaṁta* (*prakrānta*), *amisa* (*amiśra*), etc. The only instances where they are preserved as in the north-west are *prakāsa* ru and *prāna* yr. It may be observed that such clusters are sometimes preserved in G also.

(11) The cluster *kṣ* : It shows the eastern *kṣ*>*kh* treatment and not the non-eastern *kṣ*>*ch*, cf. *khudaka* or *khuḍaka* (*kṣudraka*) in all versions and *dakhitaviya* (from √**dṛkṣa* or from the future base √*drakṣya*) mk. Both *khudaka* (or *khudraka*) and *dakhati* occur as loanwords in the S, M versions of the major rock edicts.[44] In fact the first major rock edict shows even the base √*dakha* (or √*drakha?*) to be eastern as against √*pasa* (√*paśya-*) which is used in G.

(12) The cluster *jñ* : In yr we see the eastern change *jñ* > *n* (and not the non-eastern *jñ* > *ñ*) in √*ānapa* (√*ājñapa*) and *nātika* (*jñāti*). Now √*āṇapa* occurs already in the S, M versions[45] and the Mysore version which shows that the original draft had √*āṇapa*. The yr version, however, changed it to √*ānapa* as it changes *ṇ* > *n* in almost all instances (cf. above p. 88). In the case of *nātika*,[46] however, it seems that it occurred in the original draft itself as a borrowing from the east; but later, whereas it was correctly replaced by the non-eastern *ñātika* in the Mysore version, it was allowed to remain in yr.

(13) The cluster *tm* : The cluster *tm* > *tp* as in the west in the instance *mahātpa* (*mahātman*) yr. In the corresponding form *mahata* occurring in s, b, ru, kpb it shows the eastern assimilation *tm* > *t*, which is already found as a borrowed element in the S, M versions.

(14) The cluster *ṣm* : The pronominal forms *tuphe* yr and *tupaka* (for *tuphāka*) ru (**tuṣma*) are also north-western in origin since we have *sm* > *sp* in the loc. sg. term. in S, which would explain the assimilated form *ph*.: **tuṣma* > *tuṣpa* > *tu*(*p*)*pha* (cf. above *ṭh* as assimilation from G *sṭ*, p. 88).

43. For the probability of the base √*pāva* being eastern as against non-eastern √*pāpa*, see below p. 93, f.n. 54.

44. The eastern *kṣ* > *kh* treatment seems to have exercised some influence in the north-west so that we see it also in the instance *nikhetu* (*ni* √*kṣip*) in the Bhaṭṭiprōḷu inscription (Phil. Ind., p. 220).

45. G has √*ñapa*; the proper north-western *ñ* is shown also by Bhaṭṭiprōḷu *ñaṁ* < *ājñam* (Phil. Ind. p. 227).

46. K in the north knows *nātika* from the east.

(15) Initial *h*: As in the Mysore version, we have instances of adding *h* before an initial vowel in such cases as *hevaṁ* (*evam*) s, ru, mk, yr, *hesā* (*eṣā*) yr. *hetā* in s is quite understandable. As we have no parallel instances in the north-west or the west, the presence of *hevaṁ*, *hesā* in the original draft of the minor rock edict can be attributed only to the influence of the king's speech.

(16) As was noted while dealing with the Mysore version in the earlier paper, the main morphological features like the nom. sg. mas. and neut. ending *-e*[47] and the loc. sg. ending *-si*[48] found in the minor rock edict are eastern. Their presence was explained to be due to the fact that they were known in the north-west through the versions of the major rock edicts. These features occur in the remaining versions of MRE as well. Some other peculiarities of noun, pronoun, and verb forms may be noted below.

(a) Nom. acc. sg. neut. - Though more frequently we find the eastern *-e*, the western ending *-aṁ* is found in *sātirekaṁ* and *ārokaṁ* in yr.

(b) Dat. sg. -The non-eastern ending *-ya* is found in *etāya aṭhāya* ru, kpb, yr; the eastern *-ye* in *etāye aṭhāye* s.

(c) Acc. pl. m.—The eastern influence in this regard can be seen also in the final portion of the yr version, for which parallel passages in the other versions are not available. Thus we have instances like *hathiyā-rohāni, baṁbhanāni*, etc., which show the eastern *-āni* ending. LUEDERS (*Philologica Indica*, p. 278 ff.) has shown this ending to be of old-Ardha-māgadhī. These endings are found in the north-west[49] and in a few cases in the west[50] and hence their occurrence in the original draft is explainable.

(d) Among the pronouns, the nom. sg. of the first person is *hakaṁ* in b, yr which is an eastern form. Its presence in the minor edict is to be attributed to the influence of the king's speech. (cf. *hevaṁ* etc. above).

(e) In the instr. sg., the non-eastern *mayā* is given by yr, and the eastern *mamayā* by b. kpb and yr give *me*, which, however, is confused with the gen. sg. form.

(f) In the second person, the forms *tuphe* yr and *tupakaṁ* (= *tuphāka*(*ṁ*)) ru are north-western as explained above, p.90 (cluster *ṣm*).

47. Cf. *upāsake, phale, sāvaṇe*, etc.
48. Cf. *Jaṁbudīpasi.*
49. Cf. *yutani, grahathani*, etc.
50. Cf. *khaṁdhāni, gharastāni, pāsaṁḍāni, pavajitāni* in G as given by HULTZSCH, p. lxii; the proper western ending is–*e*. Cf. *yute, athe*, etc.

(g) In the demonstrative, nom. sg. m. is *iyaṁ*, which is an eastern form along with *ayaṁ* which is non-eastern. But *iyaṁ* in the minor rock edict may not be regarded as a borrowing from the east. It seems to occur owing to confusion with the neut. sg. form *iyaṁ* which as a borrowing already occurs in the west. Cf. the following expressions : *iyaṁ phale* s, br, sd, *iyaṁ sāvaṇe*, br, sd, kpb or *iyam sāvane* s, kpb, yr with such expressions as *iyaṁ pakame* br, sd, yr and *iyaṁ aṭhe* s, ru, br, kpb.

In section G, s gives *ese* where corresponding ru version gives *esā* and br, sd, and kpb give *iyaṁ*. Obviously the original draft had *iyaṁ* as referring to *phale* occurring in the preceding section. But this *iyaṁ* was mistaken to be fem. and rendered as *esā* in ru, and mistaken to be mas. and rendered as *ese* in b. I would thus regard *ese* in b as *mas.*[51] and *esā* in ru as fem. forms.

(h) The non-eastern instrumental *iminā* is given by yr (cf. above p. 85), and the non-eastern dat. *imāya*[52] is given by ru.

(i) Among the verb forms, it may be noted that the present part. middle ending *-mīna* s, b, ru, yr, or *-mīṇa* kpb is non-eastern.[53] Its occurrence in the s version in *palakamamīnenā* is to be regarded as a borrowing from the original draft. Similarly *samāṇa* in kpb is non-eastern, while *saṁta* in s is eastern.

(17) In the end we may consider the use of certain forms of a word or the use of different words[54] for expressing an idea which throws

51. Also note that in mk *aṭhe* is added after *iy*[*aṁ*]. It is possible that the translator of the b version had *aṭhe* in view and not *phale* and hence he used *ese* as mas. In any case *ese* and *esā* cannot be regarded as neut. as HULTZSCH, p. cxxvii, takes them to be.

52. The same form occurs in G, while the eastern form as shown by D is *imāye*.

53. BLOCH, op. cit. § 47 (p. 80) holds a different view. He observes "De toute facon la forme en *-mīna* est orientale". That is why he regards the form *karamino* occurring in S as oriental (§ 34, p. 72). But I have already shown in the paper on the Mysore version why the forms in *-mīna* have to be regarded as non-eastern. LUEDERS (*Beobachtungen über die Sprache des buddhistischen Urkanons*, pp. 157-159) rightly treats the present participles in *-nt* as an eastern characteristic.

54. In the following sections the case of the word *idānīm* has not been considered. The north-western S version (and also the northern K) substitutes in the first edict *aja* (*adya*) of the other versions by *idani*. Among the versions of the minor rock edict also we find the use of *dāni* in the non-eastern versions viz. ru, mk, yr, and *dāṇi* in kpb. But the evidence is rather scanty to allow us to look upon it as showing dialectal variation. For other isolated instances we may also compare *udāra* (*-la*) in all versions except Mysore, where we get *mahātpā*, and yr, where we have *mahādhanā*; *sātireka* (*-l-*) in all versions, but once the Mysore group has *adhika*; √*ārādha* (*-l-*) in all versions, but √*adhigama* (*adhigatave, adhigachcyā*) in mk; (for *upagata* in mk see above p. 86, f.n. 22; for *pure* in mk and *velā* in kpb see below p. 94, f.n. 58; for *dhamayuta* and

light on the dialectal distinctions in the days of Aśoka. It was pointed out while dealing with the Mysore version that such a distinction seems to have existed in the use of *vagra* (i.e. *varga*) in the north-west and *jana* in the east (the use is illustrated in the two separate edicts). In the following sections, instances from the Mysore version are also cited as these words were not discussed in the previous paper.

(i) We have for Skt. *manuṣya* or *mănuṣa* properly speaking, two forms in the Aśokan inscriptions viz. *munisa* and *manusa* (or *manuśa* with palatalisation). Of these, *munisa* occurring in D, J is eastern, and *mănusa* occurring in G, K[55] or *manuśa* in S, M is non-eastern. But *munisa* occurs as a loan in M also, and this form being known in the north-west it was probably used in the original draft of the minor rock edict. It was naturally retained in the eastern s version, but was also retained in the Mysore and yr versions. The eastern form, however, was replaced by the non-eastern form *mănusa* in the kpb version which has been read by TURNER as *mănusa* (but which I would read as *mānusa*,[56] (see above p. 89, f.n. 39). Now *mānusa* actually occurs also in the western G version in XIII 5 in the form *mānusānaṁ*[57] (gen. pl.).

(ii) Mainly two words occur in all the versions of the major rock edicts to express the idea of time, viz. *aṁtala* and *kāla*. But their use shows a distinction in meaning : *aṁtala* occurs where a long passage of time is intended to be conveyed, and *kāla* occurs where the idea to be conveyed is 'at all times, night and day'. Now this distinction seems to have been peculiar to the east, and similar constructions occur in the major edicts of even the non-eastern regions because they are transla-

kalaṁta in mk see below p. 95, f.n. 59). Perhaps √*pāpa* in all versions, but √*pāva* in s may be looked upon as showing dialectal distinction.

55. In K we have *manuṣa* also.

56. But the point of interest in this section is not the cerebral *ṇ* or dental *n*, but the vowel variations in the two forms *munisa* and *mănusa*. For a preference of the vowel sequence *u*(*o*), *i*, *a* in the eastern language, see LUEDERS, *Beobachtungen* etc., p. 38, where he cites such instances as *pulisa*, *munisa*, *no mina*. Pāli and Pkt. on the other hand have *măṇusa*. Most of the modern Indian languages show the western form, cf. H. Bg. *mānus*, As. *mānuh*, P. M. *māṇūs*, G. *māṇas*; the *i* vowel of the eastern *munisa* can be seen in As. *munih*, Bg. *munis*, Or. *miṇisa*, Sgl. *minisa* (*minihā*); Nep. *mānisa* seems to have arisen from the contamination of the eastern and western forms (for the distribution of the words in the modern Indian languages I am indebted to TURNER's *Nepali Dictionary* and op. cit. p. 8, f.n. 2(4) where he considers Nep. *mānis* as contamination of *mānuṣa* and *purisa*.

57. TURNER, op. cit., p. 8, f.n. 2 reads here *manusānaṁ* which is clearly against the palaeographic evidence. The *ā* stroke of *mā*, so far as I can see, is perfectly visible on the estampage, and is similar to the form of *mā* in *mātr[i]* line 3, ***Turamdyo*** line 8, etc., occurring in the same inscription.

tions of the Māgadha version. To illustrate the above usage we may quote the following expressions from the Dhauli version :—

(a) *atikaṁtaṁ a ṁ t a l a ṁ* 'in past times'. The expression occurs in the rock edict IV, V, VI, VIII, and it has its parallels in the other versions.

(b) *atikaṁtaṁ a ṁ t a l a ṁ no hūta-puluve savaṁ k ā l a ṁ aṭhakaṁme va paṭivedanā va* (Rock edict VI). "*In times past* neither the disposal of affairs nor the submission of reports *at all times* did exist before". (HULTZSCH's translation. Italics mine). This sentence illustrates at the same time the use of both *aṁtala* and *kāla*.

That this mode of distinction was not properly speaking current in the non-eastern regions can be seen from the versions of the minor rock edict. In these versions, the word *kāla* is used in all non-eastern versions where the eastern s version alone, consistent with the above usage, replaces it by *aṁtala;* cf. the following quotation from the E section of the ru version :

yā imāya k ā l ā y a Jaṁbudipasi amisā devā husu...... "The gods who for (*all*) *this time* had been unmixed (with men) in Jambudvīpa..." (HULTZSCH's translation, ital. mine).

Correspondingly the Mysore and the yr versions have *iminā cu kālena;*[58] but the s version alone has *etena ca aṁtalena,* because the idea to be conveyed is 'in past times' and not 'at all times'.

(iii) In the versions of the minor rock edict we get two sets of expressions for 'to be zealous' or to have 'zeal' in practising morality. These expressions are $\sqrt{}$*pakama-* (*pra* $\sqrt{}$*kram-*) and $\sqrt{}$*palākama-* (*parā-*

58. b version is here missing; mk substitutes the expression by using *pure* just as it has made many other changes in the text of the version. The kpb uses *imāyaṁ velāyaṁ* instead. The use of *velā* in kpb is a little difficult to explain. At the moment I am inclined to explain it as a possible confusion in the reading of the original draft. If this explanation proves to be correct it will show that the edict was issued from the north-west in the Kharoṣṭhī script. If the right hand loop of the *ka* symbol in the Kharoṣṭhī script was forgotten or illegibly put in the draft which reached the hands of the translator responsible for the kpb version then the symbol could be easily mistaken for *va*. Now since the Kharoṣṭhī script does not mark the length of the vowels, in the original draft the word *kālāya* must have stood as *kalaya.* This being misunderstood as *valaya,* the scribe seems to have corrected the stem *vala* to *velā* and added the final anusvāra to the ending *-ya* which he thought to be loc. sg. He thus arrived at the form *velāyaṁ.* For the present, however, this explanation must be taken for what it is worth. P. MEILE (Misā Devehi Chez Asoka, JA 237, p. 209, 1949), on the other hand, would like to restitute *velāyāṁ* in the ru version on the basis of the same word occurring in the kpb version, as the symbol for *kā* in *kālāya* in ru is not quite legible. The estampage published by HULTZSCH will show that this suggestion is hardly tenable.

√*kram-*).[59] In fact the main purpose of the minor edict is to encourage all men—those that are highly placed and those that are placed low—to be more and more zealous in the practice of morality. To express this idea all non-eastern versions viz. ru, br, sd, kpb, yr[60] use the verb from √*pakama* as in *pakamatu*,[61] or the past passive participle *pakata* (*prakrānta*), or the middle pr. part. *pakamamina*, or the noun *pakama* (*prakrama*). But the eastern version s[62] consistently gives forms of √*palākama*, *palakaṁta*, *palakamamīna*, and *palākama* instead of the above forms.

Among the versions of the major edicts, even S, M, G show the eastern √*parākrama-* which, in the light of the above evidence, is to be attributed clearly to the influence of the eastern √*palakama* as seen in D, J, K.

(iv) The word for 'year' used in the versions of the major rock edicts, issued from the east, is *vasa* (or *vāsa* G, *vaṣa* S, M). The context shows that this word was used in official reckonings of regnal years like *duvāḍasavasābhisita* (IVth edict) etc.; or it was used when the period of the official tours was to be specified as in *paṁcasu vasesu* (IIIrd edict) or *tiṁni vasāni* (1st separate edict), or when the passage of many years was intended to be conveyed, cf. *bahūni vasa-satāni*, *bahūhi vasasatehi* (IVth edict). Now when we look at the versions of the minor rock edict we find that in the s version, which is also eastern, the only word for 'year' that appears is *savachala*. Here, however, the context is altogether different. The word does not occur in any of the situations referred to above, but is used while counting the years of the king's relationship with the Buddhist order. Thus it says—

(*aḍha*) *tiyāni savachalāni aṁ upāsake sumi* "(Two and a half) years (and somewhat more have passed) since I am a lay-worshipper",

59. The mk version avoids the use of either of these two expressions, probably because of their somewhat unusual meaning. Instead we find the use of *dhamayutena* and *kalaṁtaṁ* in mk.

60. In yr both BARUA and BLOCH read *pak*(*k*)*ate* (twice), *pak*(*k*)*amasa*, and *pak*(*k*)*amc*. But in lines 7-8, BARUA reads *pakamamīnena*, which BLOCH would correct to *pa*(*rā*)*kkamīnena*. Now the plate given by D. C. SIRCAR (IHQ 7, to face p. 738, 1931) clearly shows that BLOCH's suggestion cannot be accepted. We have, therefore, to retain BARUA's reading which is also in agreement with the regional distinction shown above. A little further in line 9, both the scholars read *parak*(*k*)*amevū* (Bloch *-rā-*). The plate referred to above shows that the letter read as *ra* or *rā* is defaced and perhaps testifies to the writer's attempt to cancel whatever symbol he may have inscribed. I, therefore, suggest that in line 9 also we should read *pakamevū*.

61. The forms cited are from the ru version.

62. The b version is much mutilated; but as it agrees with the s version in general it also may have given forms with √*palakama*.

and *savachale sādhike aṁ*........ "But a year and somewhat more (has passed) since (I have visited the Saṁgha and have been more zealous)."[63]

It is thus clear that in the eastern dialect *vasa* was used for mundane purposes, while *savachaka* was used for ecclesiastical purposes. This distinction does not seem to be strictly observed in the non-eastern regions, so that in the context referred to above all the versions except s use *vasa* in the first occurrence of the word (*sātirekāni aḍhatiyāni vasāni ya hakaṁ upāsake*), but keep *savachara* in the second occurrence (*sātireke tu kho saṁvachare yaṁ mayā saṁghe upayīte*......).

(v) For negation the eastern versions use *no* while the non-eastern versions have *na*.[64] Among the versions of the minor rock edict, all have the eastern form, as it has been already borrowed in the G, S, M versions, but only the yr version gives the non-eastern *na*, and the b and the mk versions have *na* once. The s version is supposed to give *na* once in the first line; but in view of the strong evidence for *no* being eastern, I would regard this a scribal mistake for *no*. Similarly the particle *tu* appears to be western, but *cu* eastern.[64] Among the versions of the minor rock edict, all give the eastern form as a borrowing, except the versions at Mysore and Yerraguḍi.

(vi) In the days of Aśoka the word for 'to write' in the north-west was $\sqrt{}$*nipisa*[65] which was borrowed from old Persian, cf. such forms as *nipista, nipistaṁ, nipesita*, and *nipesapita* occurring only in the S version, edict Nos. IV, V, VI, XIII, and XIV. The corresponding word which occurs in all the other versions is $\sqrt{}$*likha*. It must be noted that the M version at all places and the S version also in some places give the forms of the verb $\sqrt{}$*likha*. Now among the versions of the minor rock edict we get forms of $\sqrt{}$*likha* only, cf. *lekhāpeta* ru, [*likhāpa*]*yăthă* s, *likhāpetavaya* ru, *likhita* br. The original draft also may have contained $\sqrt{}$*likha* instead of $\sqrt{}$*nipisa* as it was known in the north-west as well.

(vii) In the use of vocabulary there is one point in which the br version agrees with the west and not with the north-west. Unfortunately the word referred to in this section does not occur in the other versions of the minor rock edict. For 'the writer', the br version uses *lipikara* which occurs also in G (the K version has *lipikala*); but the S version gives *dipikara*. This Persian word *dipikara* of the orignal draft was thus replaced by the Indo-Aryan *lipikara* in the br version. Other versions of the major rock edict where this word occurs in G, K, S are defective. It is obvious, however, that the D and J versions must have

63. Translation of HULTZSCH; the lacunae have been filled up from the ru version. The use of the word *savachala* by the s version is, however, clear.

64. Cf. BLOCH, op. cit., p. 82.

65. See HULTZSCH, p. xlii.

contained *lipikala*, while the M version, though it shows many 'Māgadhisms', in this respect must have contained the north-western *dipikara*. This becomes clear from the fact that the M version always agrees with the S version in giving the ancient Persian word *dipi*, while in all other versions we have *lipi*. This happens also when in the same sentence in M we find the use of eastern $\sqrt{}$*likha*, where S has $\sqrt{}$*nipisa*, but both S and M give *dipi*, cf. *ayi dhramadipi nipista* S, and *ayi dhramadipi likhita* M (5th edict, section O; also cf. 6th edict, section M, 13th edict, section X. and 14th edict, section A). This shows that while the Old Persian word *dipi* had completely ousted *lipi* in the north-west in the days of Aśoka, the word $\sqrt{}$*nipisa* had not succeeded in doing so.

NOMINAL STEM-FORMANTS IN OLD MARATHI

By

M. G. PANSE

In *"Some Problems of Historical Linguistics in Indo-Aryan"* Dr. S. M. KATRE has discussed "Nominal Stem Formation in Indo-Aryan" in the fourth lecture in the Series of his Wilson Philological Lectures. Making reference to WACKERNAGEL'S *"Altindische Grammatik"*[1], LINDNER'S *"Die Altindische Nominalbildung,"*[2] MACDONELL'S *"Vedic Grammar,"*[3] and *"Vedic Grammar for Students,"*[4] WHITNEY'S *"Sanskrit Grammar,"*[5] RENOU'S *"Grammaire Sanscrite"*[6] and HJ. FRISK'S *Suffixales —tha* and *ra,"*[7] KATRE gives a very clear and detailed account of nominal stem-formation in OIA in particular and points out that "The comparative study of these nominal stem-formantia in the entire field of IA was still a desideratum."[8]

KATRE'S discussion deals with 74 primary and 49 secondary suffixes found in the earlier stage of OIA and for classical Sanskrit he gives a summary in great details from RENOU'S *Grammaire Sanscrite* (§§ 138-205).

As regards MIA languages GEIGER treats only some suffixes connected with verbal nouns and PISCHEL'S few generalisations on this topic are scanty. KATRE has given phonological equivalents in MIA of the attested OIA suffixes. Recently in *"Nominal Composition in MIA"*[9] Miss G. DAVANE has studied nominal stem-formation in Pālī and Prākṛt in some detail following a rather short but clear account of it by Sukumar SEN in his *"Comparative Grammar of Middle Indo-Aryan"*[9a]. G.V. TAGARE reserves a small chapter for this topic in his *"Historical Grammar*

1. J. WACKERNAGEL—A. DEBRUNNER, *Altindische Grammatik*, II, 2, Goettingen, 1954.
2. LINDNER, *Die Altindische Nominalbildung*, Jena, 1878.
3. MACDONELL, *Vedic Grammar*, Strassburg, 1910.
4. MACDONELL, *Vedic Grammar for Students*, Oxford, 1918.
5. W. D. WHITNEY, *A Sanskrit Grammar*, Leipzig, 1889, pp. 418-480.
6. L. RENOU, *Grammaire Sanscrite*, 1930.
7. HJ. FRISK, *Suffixales –tha*, and *–ra*: *Vide*: *Zur Indoiranischen und Griechischen Nominalbildung*, Göteborg, 1934, pp. 1-49.
8. S. M. KATRE, Some Problems of Historical Linguistics in Indo-Aryan, *BV*. II, p. 225.
9. In press.

9a. SUKUMAR SEN, *Comparative Grammar of Middle Indo-Aryan*, Calcutta, 1951, pp. 129-133.

of Apabhraṁśa."[10]

Formative suffixes in NIA languages have been studied by various scholars such as HOERNLE—Gaudian languages,[11] GRIERSON—Kaşmirī[12] and Maithili,[13] S. K. CHATTERJI—Bengali,[14] B. KAKATI—Assamese,[15] Subhadra JHA—Maithili,[16] S. M. KATRE—Koṅkaṇī,[17] S. G. TULPULE[18] and R. B. JOSHI[19]—Marathi.

Jules BLOCH has not touched this topic in his *"La formation de la langue marathe"*—the classic in the historical study of a modern Indian language.

The present study is restricted to nominal stem-forming suffixes in Old Marathi with special reference to Jñāneśvarī—a representative OM. Text. The vocabulary of Jñāneśvarī has about 63% Sanskrit loan words[20] and it is obviously unnecessary to deal with that stock here when much work is already done on derivative suffixes in Sanskrit. Consideration of the remaining 37% of the vocabulary limits the scope of this study.

The nominal base in Old Marathi (OM) is composed generally with the help of one stem-formant but sometimes two or even three formative suffixes go to build up an OM nominal base. Nominal stem-formants are either (A) Primary or (B) Secondary.

It is to be noted that a Sk. formative suffix may appear with an inherited word without changing the meaning of its corresponding Sk. form—as in (primary) *athitva*—existence, (secondary) *puchavanta*—having a tail, etc. or, with a form that is apparently loaned from Sanskrit but its meaning changed e.g. *lekhīya*—to be valued.

10. G. V. TAGARE, *Historical Grammar of Apabhraṁśa*, Deccan College, Poona, 1948, pp. 333-343.
11. A. F. RUDOLF HOERNLE, *A Comparative Grammar of the Gaudian Languages with special reference to Eastern Hindi*, London, 1880, pp. 95-158.
12. G. A. GRIERSON, *Essays on Kācmīrī Grammar*, London and Calcutta, 1899, pp. 103-165.
13. G. A. GRIERSON, *An Introduction to the Maithilī Dialect of the Biharī Language as spoken in North Bihāra*, Part I, Calcutta, 1909, 2nd Ed., pp. 24-42.
14. S. K. CHATTERJI, *The Origin and Development of the Bengali Language*, Calcutta, 1926, part II, pp. 651-706.
15. B. KAKATI, *Assamese, Its Formation and Development*, Gauhati, 1941, pp. 231-265.
16. S. M. KATRE, *Some Problems of Historical Linguistics in Indo-Aryan*, Wilson Philological Lectures, Bombay, 1944, p. 188, 304.
17. S. M. KATRE, *Formation of Koṅkaṇī*, 1942, pp. 297-300.
18. S. G. TULPULE, *Yādava Kālīna Marāṭhī Bhāṣā*, Bombay, pp. 274-278.
19. R. B. JOSHI, *A Manual of Marāṭhī Derivatives*, Poona, 1910.
20. M. G. PANSE, *Linguistic Peculiarities of Jñāneśvarī*, Poona, 1953, p. 6.

(A) *Primary stem-formants*

1. Primary stem-formant is added directly to original verbal bases as also to verbal bases with prefixes or conjugation stems.

2. In OIA the form of a root taking up a primary stem-formant is liable to some variation by either *guṇa* or *vṛddhi* increment, and sometimes the root is reduplicated. It is not necessary to consider these aspects here, obviously because OM has inherited verbal forms from OIA through MIA and Apabhraṁśa with phonological changes and because either 'guṇa' or 'vṛddhi' is not an OM peculiarity, e.g. OM *khevaṇa* < MIA *khevaṇa* < OIA *kṣepaṇa* √*kṣip*.

3. Primary stem-formants are indicative either of an action expressed by a verbal root or an agent (person or thing) in which the action appears. The agent can be either nominal or adjectival.

4. Some stem-formants like *-anta* < MIA *-anta* < OIA *-ant* show a striking influence of OIA in formations like *sāṁta* (OIA √*as*) being, existing.

5. Certain OM verbal bases are to be traced only to their MIA stage e.g. *khola-ta* < MIA *khulla-*, *dekha-ṇā* < MIA *dekkha-* etc.

6. Before a stem-formant beginning with a vowel final *-a* of the verbal base is generally lost altogether.

7. Primary stem-formants may be broadly classified as (i) Nominal, (ii) Adjectival and (iii) Nominal and Adjectival both.

Nominal

(1) *-āī* < MIA *-āviā* < OIA causative *-āp-ikā*.
Action—*utarāi* (OIA *ut-tṛ-*) one discharged from obligation.

(2) *-āṇa*:
Action—*uḍāṇa* (<OIA *uḍḍī*) soaring, jump.

(3) *-āra* < MIA *-āra* < OIA *-kāra*.
Agent—*khoṁcāra* (<OIA *skoṣ-*) a forked instrument.

(4) *-āvā* < MIA *-ava-a* < OIA **-āpa—ka*.
Action—*caḍhāvā* (< MIA *caḍḍhai*) ascent, increase.
rigāvā (< OIA *riṅg-*) entry, *māgāvā* (< OIA *mārg-*) trace.

(5) *-itī* f.—*iteṁ* n. (OIA *-ti* with modification of the root vowel a : i, cf. *aka* : *ika* ?).
Action—*bharitī* (< OIA *bhara-*) flood, *bhariteṁ* abundance, overflow.

(6) *-ī* < MIA *-iā* < OIA *-ikā*.
Action—*ukalī* (OIA < *ut-kal-*) boiling, *tarī* (OIA *tara-*) boat, *tuṭī* (< *tuṭa* < *tṛṭ-*) deficiency.

(7) *-ovā*:
Agent—*sāṁḍovā* (*sāṁḍa* <MIA *chaḍḍa* < OIA *chard-*) casting away.

(8) *-ṭī* < MIA *-vaṭṭiā* < OIA *-vṛttikā.*
Action—*rāhāṭi* (< *rāh-*) custom, course, behaviour.

(9) *-ṇa* < OIA *-ana.*
Action—*khevaṇa* (< OIA *kṣip-*) stud, *nhāṇa* (< OIA *snā-*) bath. *paḍaṇa* (< OIA *pat-*) fall.

(10) *-ṇī* < OIA (*-a*)*-na-ikā.*
Action—*koṁḍaṇī* (< OIA *kuṇḍ-*) enclosure, *ghasaṇī* (< OIA *ghṛṣ-*) contact.
Agent—*nācaṇī* (< OIA *nṛty-*) dancing girl.

(11) *-ṇeṁ* < OIA *-anakam*
Action, Agent—all gerundives.

Adjectival

(12) -(*a*)*ta*, *-ta*, (< MIA *-anta* < OIA *-at.*,)*-tā* m. *-tī* f. *-teṁ* n
Agent—*kholatā* (< MIA *khulla-*) guide, *jitā* (< OIA *ji-*) living, *yeti* (<OIA *i-*) coming, *jiṇateṁ* (*jiṇa-* < *ji-*) winning (for details see L.P.J. p. 102).

(13) *-anta* < MIA—*anta* < OIA *-ant.*
Agent—*jīvaṁta* (< MIA, OIA *jīv-*) alive, *saṁtā* (< OIA *as-*) being existing.

(14) *-ika*, cf. *-aka.*
Agent—*bolikā* (< MIA *bolla-*) talkative.

(15) *-iya* < MIA *-iya* < OIA *-ita.*
Action—*bhariya* (< OIA *bhara-*) complete (< **bharīta*, after *harita* < √*hṛ* ?).

(16) *-uka* < MIA, OIA *-uka.*
Agent—*bhāṇḍuka* (< OIA *bhaṇḍ-*) quarrelsome.

(17) *-uta*, *ota*, *-auta*, < MIA -(*v*)*utta*, < OIA *-vṛtta.*
Agent—*varatā* (OIA *vṛ-*) additional, more; *varautā*—master; select one.

(18) *-eta*, same as above.
vareta (OIA *vṛ-*)

Nominal and Adjectival both

(19) *-aka*:
Agent—*niṁdaka* (< OIA *nind-*) reviler, *bolakā*, *-kī*, *-keṁ* (MIA *bolla-*) talkative.
Action—*baisaka* (< OIA *upa-viś-*) seat,

(20) *-ā* < MIA *-aa* < OIA *-aka.*
Action—cālā (< OIA **caḷya-*) some movement, *jāgā* (<OIA *jāgṛ-*) awake.
Agent—*maṁthā* (< OIA *manth-*) churning stick.

(21) *-ira* < MIA, OIA *-ira.*
Agent—*khāira* (< OIA *khād-*) eater.
Action—*gumpira* (< OIA *guṣp-*) hindrance, tangledness.

(22) *-iva* < MIA, OIA *-iva.*
Action—*jāṇiva* (*jāṇa-* < OIA *jñā-*) understanding *bhariva* (< OIA *bhara-*) substantial, *vāhiva* (< OIA *vah-*) cultivation, tillage.

(23) *-aṇā* < OIA *-a-na-ka.*
Agent—*jāgaṇā* (< OIA *jāgṛ-*) who is awake, *dekhaṇā* (MIA *dekkhai* q.v.L.P.J. p. 132) handsome, *baisaṇā* (< OIA *upaviś-*) who is sitting.
Action—*vānaṇā* (OIA *varṇa-*) description.

(24) *-ā-ṇā*:
Agent—*phuṭāṇā* (OIA *sphuṭ-*) soaked and parched gram.

Double Primary Stem-formants

(1) *-la-ṇā*:
Action—*gusalaṇa* (< OIA *ghṛṣ-la-ana*) the act of churning.

(B) *Secondary Stem-formants*

Secondary stem-formants in OM are added to a nominal bases which may be traced back to:—

(i) OIA nominal stems formed by appending primary suffixes e.g. *kāma* < OIA *kar-man, jāṇā-* < OIA *jñā-na*, ppp. *bhāta-* < OIA *bhak-ta, nāgavaṇa* < OIA *nag-na-*; pot. p. *pāṇī* < OIA *pānīya;* gerundives like *nācaṇi* < OIA *nṛt-ya-* etc.

(ii) OIA adjective *eka, cokha* < *cokṣa, vega* < *vyagra- thoḍā* < *stoka* , *halu* < *laghu.*

(iii) OIA pronominal base : *itukā* < OIA *-iyat, ketulā* < OIA *kiyat* etc.

(iv) MIA noun—: *nāka* < *ṇakko, ḍolasa* < *ḍolā, ḍālukā* < *ḍallā, ḍhepuli* < *ḍheppa, koṁpaṭa* < *khuṁpa, hāḍa* < *haḍḍa* etc.

(v) Kanarese noun : *ūba* < *ubbā, bocarā* < *boccu-* etc.

(vi) *veḍiva* < *veḍa, vauseyā* < *vasā-.*

On consideration of their function the secondary stem-formants are:

(1) Substantival : Concrete : *-āra* < *-agāra-, -ula* < *kula, -aula* < **phulla, -vaṭī, -vaṇī, vana;*
Abstract : *-āī, -iva, -paṇa*

(2) Adjectival : *-āthilā, -āra* < *-kāra, -āri* < *kārin, -iṭa, -iṭha. -ita, -ila* < *-ita, -isa, -i,-utā, -uti, autā, -ka, -kaṭa, -ca, -cā, -ṭha, -ṭhā, -ṭhī, -ḍhā, -ṇā, -tā, -tuka, -tula, -rā, -vāra, -laga. -va* < *-vat, -vaṭa, -vaṭā, -vaḍa- -vaḍā, -sa* < *-dṛśa, -sura.*

(3) Possessive :

-āla, -ālu, -āva, -ira.

(4) Relative : *-ika, -iva, -ī* < *-īya.*

(5) Diminutive : *-ka. -kuṭā, -kula, -ṭa (-ṭā -ṭī -ṭeṁ), -ḍa, -ḍeṁ -rūṁ.*

(6) Pleonastic : *-uka, -ula, -ga, -ṭa, -ḍa, -ṇa, -la, -lai.*

(7) Forming feminine nouns : *-iṇi, -ī, -ṇī,* etc.

It is clear from this that a large number of secondary stem-formants are adjectival in their function.

There are certain secondary stem-formants which are really independent words and can be said to form a hidden-compound if an apparently single word may be so called. For instance *-rūṁ* < OIA *-rūpam* in *pākhirūṁ, gorūṁ, -aula* < OIA **phulla* in *gaganaulem̐, vām̐jhaulem̐* etc.; or *-vaṇī* < OIA *-pānīya* in *dhāravaṇī;* and *-āra* < OIA *-agāra* in *bhām̐ḍāra.*

Besides these the following may be listed as forming the same category.

-āthila, -āra, -ārī, -auta, -kaṭa, -tuka, -laga, -vaṭa, -vaḍa, -vana < *-parṇa, -sura* < *-asura.*

Of the secondary stem-formants some can be traced back to:

OIA derivative suffixes : *-ā* < *-aka, -āva* < *-aka-tva,*

-i < *īya, -ika; -ṭha* < *-iṣṭha, -īra, uka, ca* < *tya,*

-paṇa < *-tva-na.*

OIA nouns : *-āra* < *āgara, -ula* < *kula, -rūṁ* < *rupam, -vaṭī* < *paṭṭikā*

-vaṇī, < *pānīya,* etc.

OIA pr. p. : *-anta, -tā* < *at-aka,* similarly *-tī.*

OIA adjectives : *-āra* < *kāra, -āḍa* < *aṭṭa, -vā* < *-vat, -sa* < *-dṛśa,* etc.

OIA root form + suffix : *-ṭhā* < *-stha + ka, āthilā* < *-asti + -alla-* etc.

OIA Causative suffix : *-vaṇa* < *-āpa-na.*

MIA derivative suffix : *-āla, -ālu, -ila,* < *-illa, -ula* < *-ulla.*

With the help of secondary stem-formants :

(I) Substantive gives rise to a substantive.

(II) Substantive gives rise to an adjective.

(III) Adjective gives rise to a substantive.

(IV) Adjective gives rise to an adjective.

(V) Adverb gives rise to a substantive.

(VI) Adverb gives rise to an adjective.

(1) Substantives give rise to substantives :

(1) *-a* < MIA *-a* < OIA *-aḥ* m., *-ā* f., *am*, *-as*, n., *kāna* (*karṇaḥ*) ear, *mana* (*manas*) mind, *dāra* (*dvāram*) door, *dāḍha* (*daṁṣṭrā*) tooth.

(2) *-ā* < MIA *-aa* < OIA *-aka*.
usāsā (*ucchvāsa-*) breath, sigh; *khavaṇā* (*kṣapaṇa-*) a Jain monk, *cuna* (*cūrṇa-*) lime.

(3) *-āḍa, -āḍeṁ* < MIA *-aa-ḍa* < OIA *-aka+ṭa* : largeness, extensiveness; *kābāḍa* (cf. OIA *karma-*), exertion, labour; *pāṇiyāḍeṁ* (OIA *pāniya*) pond, water-receptacle, *nākāḍa* (MIA *ṇakko-*) large ugly nose, *siṁhāḍeṁ* (OIA *siṁha-*) lion.

(4) *-āra* < MIA, OIA *-āra*.
aṇuāra (OIA *aṇu-*) dust, *gāṁvāra* (OIA *grāma-*) villager.

(5) *-āra* < MIA *-āra* < OIA *-kāra*.
kuṁbhāra (OIA *kumbha-*) potter, *jujhāra* (OIA *yuddha-*) fighter, *suāra* (OIA *sūpa-*) cook, *sonāra* (OIA *suvarṇa-*) goldsmith.

(6) *-āra* < MIA *-aāra* < OIA *-agāra*.
kothāra (OIA *koṣṭha-*) store-room, *gābhāra* (OIA *garbha-*) inner apartment, *taṇhāra* (OIA *tṛṇa*) straw-hut, *bhiṁgāra* *bhinga*=glass) glass-case, *sejāra* (OIA *śayyā-*) bed-room.

(7) *-ārī* < MIA *-āri* < OIA *-kārin*.
kamārī (OIA *karma-*) servant, *juārī* (OIA *dyūta-*) gambler, *bhikārī* (OIA *bhikṣā*) beggar.

(8) *-āla* < MIA *-āla* : possession, pertaining to etc.
jiyāleṁ (OIA *jīva-*) life, *sisāleṁ* (OIA *śīrṣa*) the head.

(9) *-ālā* < MIA—*āla-a*. < OIA—*āla+ka* : extension of the above.
nepālā (OIA *nepam*) mouthful of garggled water.

(10) *-āva* < MIA *-aa-vva* < OIA—*aka-tva*.
kilāva (OIA **kila*—brightening < $\sqrt{kil}$ to be white+to send, to throw ?) splendour, luster.

(11) *-ika* < OIA *-ika*.
varhāḍika (OIA *vara-hāṭa-*) assemblage at a wedding, help; *soirika* (OIA *sahodara-*) relation by marriage. *vārikeṁ* (OIA *vāra-*) pony.

(12) *-iṇī* < MIA *-iṇi* < OIA *-ini* of fem.
gābhiṇī (OIA *garbha*) pregnant woman.

(13) *-iyā* < **i(y)a-ā* < MIA—*ia+āa* < OIA *ika+*-āka*. *riṇiyā* (OIA *ṛṇa-*) debtor, *vouseyā* (*vasā*) who has undertaken a vow.

(14) *-ira* < MIA, OIA *-ira* : possessing.
masaireṁ (OIA *masi-*) darkness.

(15) *-iva* < MIA—*i+va* < OIA *-i+vat* :—pertaining to. *rāṇiva* (*rāṇā* < OIA *rājña-*) kingship.

gāṇiva (OIA *gāna-*) singing, praise; *veḍiva* (*veḍa*) madness, *citriva* (OIA *citra-*) toy.

(16) -*ī* < MIA -*iā* < OIA *ikā*.
kāṁṭī (OIA *kaṇṭa-*) thorny fence, *kāḍī* (OIA *kāṣṭha-* small stick, *jhāḍī* (OIA *jhāṭa-*) wood, thicket.

(17) -*īṇa* alternative form of -*iṇi* with final vowel change *i* : *a*. < MIA, OIA -*iṇi* or *ini* forming a fem. noun. *gosāvīṇa* (OIA *gosvāmi-*) mistress, *nāgiṇa* (OIA *nāga-*) female coluber Nāga.

(18) -*uka* < OIA -*uka* : pleonastic.
godhuluka (OIA *go-dhūli*) evening, *ḍālukā* (MIA *ḍaḷḷī*), branch, *nāṁdaṇuka* (OIA *nandana*) happy treatment, *bhātuka* (OIA *bhakta*) sweet-meat, eatable.

(19) -*ula* < MIA *ulla*: pleonastic.
pāula (OIA *pāda*) the foot.

(20) -*ula* < MIA -*ula* < OIA *kula*.
deula (OIA *deva-*) temple, *rāula* (OIA *rāja-*) palace, mansion.

(21) -*ulā* < MIA -*ulla*+*a* < -*ka* : pleonastic.
kāulā (OIA *kāka-*) crow, *māthulā* (OIA *masta-*) knob of a churning rod.

(22) -*ulī* < MIA -*ulla*+*iā* < *ikā*. *ḍhepulī* (MIA *ḍheppa-*) lump, *māulī* (OIA *mātṛ*) mother, *sāulī* (OIA *chāyā*) shade, shadow.

(23) -*uvā* < MIA -*u*(*v*)*ā* < OIA -*ukā*.
pāvuvā (OIA *pāda-*) the foot.

(24) -(*a*)*utā* < MIA—(*v*)*utta-a* < OIA -*vṛtta-ka*.
(with sandhi a+u=au). *balautā* (OIA *bala-*) public servant of a village, *haḍautī* (MIA *haḍḍa-*) space between collar bones.

(25) -(*a*)*uleṁ* < MIA—*ulla-aṁ* < OIA **phullakaṁ* ? (loss of -*h*- is difficult to explain, (sandi a+u=au) *gaganauleṁ* (OIA *gagana-*) sky flower, *cāṁpauleṁ* (OIA *campaka-*) Campaka flower.

(26) -*kuṭa* < MIA-*kuṭṭaa* < **kṛtta-ka* < OIA -*kṛta-ka*; diminutive. *taṇakuṭā* (OIA *tṛṇa-*) straw hut, *darakuṭā* (cf. OIA *darī-* cave) small valley, recess.

(27) -*kula* : diminutive.
gharakula (MIA *gharaṁ*) small house.

(28) -*ga* < MIA -*ga* < OIA -*ka* : pleonastic.
ubaga (*ūba* < Kan. *ubbā*) irksomeness, *gāḍugeṁ* (OIA *ghaṭa-*) earthen pot, *guḍhagā* (OIA *ghuṭa-*) knee.

(29) -*ṭa*, -*ṭā* m., -*ṭī* f., -*ṭeṁ* n. < MIA -*vaṭṭa-* < OIA *vṛtta-* : diminutive; *kuṇabaṭa* (*kuṇabī*) cultivator, peasant; *koṁpaṭa* (Deśi *khuṁpā-*) small hut, *khicaṭeṁ* (Deśi *khicca*) mixture, *ḍāṁgaruṭi* (*ḍāṁgorā-*) proclamation by a public crier. *theṁ-*

baṭā (OIA *step-*) small drop, *divaṭā* (OIA *dīpa-*) torch, *pāuṭī* (OIA *pāda*) step; *bāhuṭī* (OIA *bāhu*) arm.

(30) *-ṭhā* < MIA—*ṭṭha-a* < OIA *-stha-ka*, mas.
āgiṭhā (OIA *agni-*) fire place, *kāmaṭhā* (OIA *karma-*) office, place of work, *gharaṭhā* (*ghar-*) abode, dwelling place.

(31) *-ṭhī* < -MIA *-ṭṭha- iā* < OIA *-stha -kā*, fem. *āgiṭhī* (see *āgiṭhā* above).

(32) *-ḍa* < OIA *-ṭa* : pleonastic
seṁbuḍa (OIA *śleṣma-*) mucus in the nose (change of final vowel a : u).

(33) *-ḍā* mas. < MIA **-ḍḍaa* < (*va*)*ḍḍa-a* < OIA **-vartta-ka*. *ukaraḍā* (< OIA *utkara-*) dung hill, *siṁtoḍā* (OIA *chitra-*) a drop.

(34) *-ḍī* fem. *ibid.*
potaḍī (*poteṁ* gunny bag) a big bag of cloth.

(35) *-ḍeṁ* neut. *ibid.*
kaḍabāḍeṁ (MIA *kaḍaṁba-*) culm of jawāra dried for fodder, *mehuḍeṁ* (OIA *megha-*) cloud, *rūpaḍeṁ* (OIA *rupa-* form of the body, *sālaḍeṁ* (MIA *challi*) bark, skin.

(36) *-ṇa* < MIA *-na* < OIA -(*a*)*na* : pleonastic.
bheṇa (OIA *bhaya*) fear.

(37) *-ṇī* < MIA *-ṇi-ā* < OIA -(*i*)*n+ikā*.
āṭaṇī (OIA *ārtta-*) trouble, *gharaṇī* (OIA *gṛha-*) housewife, *nācaṇī* (OIA *nṛtya-*) dancing girl, *bhāraṇī* bewitchment, *rāṇī* (OIA *rāj -*) queen.

(38) *-tā* < OIA *-at+aka*.
jāṇatā (OIA *jñāna-*) understanding, wise.

(39) *-tī* < OIA *-at+īkā*.
kākulatī (cf. OIA *kākalī* low and sweet tone) pitiful talk.

(40) *-paṇa* < MIA—*ppaṇa* or *-ttaṇa* < OIA *-tva-na*.
Gītāpaṇa—the being *Gītā*, *bhramarapaṇa*—the being a black bee *māulīpaṇa*—the being a mother, status of a mother.

(41) *-rūṁ* < OIA *rūpaṁ* : diminutive.
gorūṁ (OIA *go-*) cattle, *dāsiruṁ* (OIA *dāsi-*) maid servant, *pākhirūṁ* (OIA *pakṣī-*) a small bird, *leṁkuruṁ* (Deśi *liṁko-*) child, *hātirūṁ* (OIA *hasti-*) young elephant.

(42) *-la* < MIA, OIA *-la* : pleonastic.
kusala (OIA *kuśa-*) bristle of grass, *khaḍala* (OIA *khaṇḍa-*) particle of stone.

(43) *-lai* : extension of *-la*.
vācālai (OIA *vācā-*) empty talk, chatter.

(44) *-vaṭī* < MIA *-vaṭṭi-ā* < OIA *-paṭṭikā*.
kasavaṭī (OIA *kaṣa-*) touch stone, *hanuvaṭī* (OIA *hanu-*) chin.

(45) *-vaṭī* < MIA *-vaṭṭi-ā* < OIA *-vṛtti-kā.*
hātavaṭī (OIA *hasta-*) skill.

(46) *-vaḍā, -ḍī, -ḍeṁ* < MIA *-vaḍḍaa* < OIA **-vartta-ka. khātavaḍeṁ* (OIA *khāta-*) dunghill, *pātavaḍā* (OIA *patra-*) detached crust, *bāṁdavaḍī* (OIA *bandi-*) bond, tie.

(47) *-vaṇī* < MIA *-vaṇia,* < *-vāṇia* < OIA *pānīya.*
dhāravaṇī (OIA *dhārā-*) stored water. (shortening of *-ā-*).

(48) *-vana* < MIA *-vaṇṇa* < OIA *-parṇa.*
gābhevana (OIA *garbha-*) inner sprout.

(49) *-vā*
diṭhivā (OIA *dṛṣṭi-*) favour, *bolavā* (MIA *bolla-*) news, rumour, saying, *rāśivā* (OIA *rāśi*) heap.

(50) *-sa* < MIA **-(a)sa* < *(d)asa* < OIA *-dṛśa.*
pāḍasa (< *paḍḍi*) young fawn.

(51) *-sā* < OIA *-dṛśa-ka.*
valasā (OIA *valaya-*) circular movement, *vāpasā* (OIA *bāṣpa*) fit state of soil to sow seed.

(52) *-seṁ* < OIA *-dṛśa-kam.*
bālaseṁ (OIA *bāla-*) plumpness of a child.

(II) Substantives give rise to Adjectives.

(1) *-āita* < MIA *-ā-itta* < OIA *-āya-(y)itra(-ka)* :
riṇāita (OIA *ṛṇa-*) borrower.

(2) *-āthilā* < MIA *-atthi -lla—a* < OIA *-asti-alla-ka* :
cittāthilā (OIA *citta-*) being in the mind, *premāthilā* (OIA *prema-*) being full of love, beloved; *sikharāthilā* (OIA *śikhara-*) having peaks.

(3) *-āla* : vide BI.
toṁḍāla (OIA *tuṇḍa-*) talkative, voluble, *pāyāla* (OIA *pāda-*) that is born feet first.

(4) *-ālu* < MIA *-ālu* : possessing.
ichālu (OIA *icchā-*) greedy, *bhukālu* (OIA *bubhukṣā-*) hungry.

(5) *-(y)āla* : vide *-āla* : possessing.
aṇiyala (OIA *aṇi-*) sharp pointer, *kaṇiyālī* (OIA *kaṇī-*) line of drops.

(6) *-ika* < OIA *-ika* : pertaining to.
āṁgika (OIA *aṅga-*) of the body, *daivika* (OIA *daiva-*) divine, *pāṁthika* (OIA *patha-*) traveller, *viṣayika* (OIA *viṣaya-*) pertaining to senses.

(7) *-iṭa, -iṭha* < MIA—*itta, -iṭṭha* < OIA *-iṣṭha.*
rāgiṭa, rāgiṭha (OIA *rāga-*) quick tempered.

(8) *-ira* < MIA *-ira* : indicative of habit.
mājirā (OIA *madya-*) intoxicated, arrogant, *lājirā* (OIA *lajjā-*) bashful.

(9) *-ila* < MIA *-illa* :
kuḍila—of the side, *domdila* (OIA *tuṇḍa-*) having a big belly, *pūrvila* (OIA *pūrva-*) eastern.

(10) *-iva* < MIA *-i(v)a* < OIA *-ita*.
lohivā (OIA *loha-*) red.

(11) *-ī* < OIA *-in*.
avevī (OIA *avayavin*) having limbs, *dandī* (OIA *dvandvin*) fighter, warrior, *virahī* (OIA *virahin*) suffering separation.

(12) *-ī* < MIA *-ia* < OIA *-īya* : *desī* (OIA *deśa-*) native.

(13) *-ula* : vide BI.
khaḍula (OIA *khaṇḍa-*) muddy, turbid.
dādulā (OIA *tāta-*) master, chief.

(14) *-aila* (*a+i=ai*) : vide *ila* above.
kombhailā (*kombha-* sprout) sprouting, *tānhailā* (OIA *tṛṣṇā-*) thirsty.

(15) *-auta* (*a+u= au*) : vide BI.
tomdautā (OIA *tuṇḍa-*) that speaks.

(16) *-ka* < MIA, OIA *-ka*.
māpaka (OIA *māpya-*) serving as a measure, *hetuka* (OIA *hetu-*) effecting, causing.

(17) *-kaṭa* < MIA *-kaṭa* < OIA—*kṛta*.
balakaṭa (OIA *bala-*) strong, *malakaṭa* (OIA *mala-*) dirty.

(18) *-cā* < MIA *-cca-a* < OIA *-tya-ka*.
pāṭācā (OIA *paṭṭa-*) of the first rank,
pāṭhicā (OIA *pṛṣṭi-*) junior.

(19) *-ṭa* < MIA *(va)ṭṭa* < OIA *-vṛtta*.
khāraṭa (OIA *kṣāra-*) salty, *dāsaṭa* (OIA *dāha-*) scorching, burning, *rogaṭa* (OIA *roga-*) diseased.

(20) *-ṭha* < MIA *-ṭṭha* < OIA *-stha*.
karmaṭha (OIA *karma-*) engaged on religious duties.
pāraṭhī f. (OIA *pāra-*) that is well advanced beyond her last bearing and is yet milch.

(21) *-ḍa* : vide BI.
hemkāḍa (*hemkā* m. inflexible adherence to opinion) obstinate.

(22) *-ḍhā* < (*va-*)*ḍḍhaa* < OIA **vadhra-ka*.
gāvamḍhā (OIA *grāma-*) rustic, ignorant.

(23) *-ṇā* < MIA *-ṇa-a* < OIA *-(a)na-ka*.
bhogaṇā (OIA *bhoga-*) who enjoyes.

(24) *-tuka*:
hātatuka (OIA *hasta-*) to be weighed by hand (on the palm).

(25) *-la* : vide BI. *ādila* (OIA *ādi-*) foremost, first.
(26) *-laga* < MIA *-lagga* < OIA *-lagna.*
āṁgalaga (OIA *aṅga-*) in contact, dependent,
kaḍelaga (OIA *kaṭa-*) that is on the bank,
vārelaga (OIA *vāta-*) flying, that is on the wind.
(27) *-va* < OIA *-vat.*
veluvā (*velu-*) of bamboo.
(28) *-vaḍa* : vide BI.
kānavaḍeṁ (OIA *karṇa-*) lying on a side.
(29) *-sa* < OIA *-dṛśa* : vide BI.
kāṁṭasa (OIA *kaṇṭa(ka)-*) thorny, *ḍolasa* (Deśi *ḍolā-*) having eyes, *rūpasa* (OIA *rūpa-*) well shaped, beautiful.
(30) *-sura* < MIA, OIA *-asura.*
nidasurā (OIA *nidrā-*) asleep, unawaked; *bhyāsura* (OIA *bhaya-*) fierce.

III Adjectives give rise to Substantives.

(1) *-āī* < MIA **-tāi* < OIA *-tāti.*
navāī (OIA *nava-*) wonder.
(2) *-āḍa* <MIA *-aḍḍa* < OIA *-aṭṭa.*
bhaḍāḍa (onomato. *bhaḍ-*) a gush.
(3) *-āla* : vide BI.
unhālā (OIA *ūṣṇa-*) heat, summar.
(4) *-ālai* < MIA *-āla+i(ka).*
mauālai (OIA *mṛdu-*) tenderness.
(5) *-āvā* < MIA *-aa-vva-a* < OIA *-aka+tva* (> *-ppa-* > *-vva-*)+*ka.*
cāṁgāvā (OIA *cāṅga-*) goodness, *volāvâ* (OIA *udra-*) humidity, wetness.
(6) *-āvo* nom. sg. of *-āva* < OIA *-aka-tva.*
unhāvo (OIA *ūṣṇa-*) heat, *hiṇāvo* (OIA *hīna-*) alloy.
(7) *-ika* < MIA, OIA *-ika* : possessing.
kovalika (OIA *komala-*) tenderness, *gāḍhika* (OIA *gāḍha-*) depth, *sāvāika* (OIA *śyāma-*) darkness, shade.
(8) *-iva* <MIA *i+va* < OIA *i+vat*: forming abstract substantive in fem.
unīva (OIA *ūna-*) shortage, deficiency, *thorīva* (OIA *sthūra-*) greatness, *sāniva* (*sāna* < OIA *ślakṣṇa*) littleness.
(9) *-ī* < MIA *-i-ā* < OIA *-ikā.*
thorī (OIA *sthura-*) growth, greatness.
(10) *-olī, -aulī* < OIA *-āvali* (or **phulla-ikā ?*).
lākholī, lākhaulī (OIA *lakṣa-*) an aggregate of one hundred thousand (flowers etc.).

(11) _-ovā_ < OIA _*āpa-ka._
nāgovā (OIA _nagna-_) loot, booty.

(12) _-aula_ < _*phulla_ : vide BI.
vāṁjhauleṁ (OIA _vandhyā-_) flower not yielding a fruit.

(13) _-kāra_ < OIA _-kāra._
ujukāra (OIA _ṛju-_) straightness.

(14) _-ḍī_ f., _-ḍeṁ_ n. < OIA _varta-ikā, -akaṁ_
cāuḍī (OIA _catur-_) public hall in a village, _lugaḍeṁ_ (OIA _rugṇa-_) garment.

(15) _-paṇa_ < OIA _-tvana_ : vide BI.
ekalepaṇa (OIA _eka-_) solitariness, loneliness,
tujhepaṇa (OIA _tuhya-_) the being yourself,
phuḍepaṇa (OIA _sphuṭa-_) openness.

(16) _-ra, rā_ < MIA _-ra_ < OIA _-ra_ (+_ka_).
ujurā (OIA _ṛju-_) straight or open way,
pāhuṇara (OIA _prāghūṇa-_) hospitality, reception.

(17) _-vaṇa_ < OIA _-āpana. nāgavaṇa_ (OIA _nagna-_) plundered state, _mājavaṇa_ (OIA _madya-_) intoxicant.

(18) _-vana_ < MIA _-vaṇṇa_ < OIA _-parṇa._
thoravana (OIA _sthūra-_) large leaf.

(IV) Adjectives give rise to adjectives.

(1) _-āṭa_ < OIA _-aka-ṭa_ : pleonastic.
junāṭa (OIA _jūrṇa-_) old, _mokāṭa_ (< _mukha_ < OIA _mukna_) free, with no binding.

(2) _-āḍa_ : vide BI.
thorāḍa (OIA _sthūra-_) uncommonly large.

(3) _-āra_:
sācāra (OIA _satya-_) true, genuine,
sināra (OIA _chinna-_) distinct, separate.

(4) _-āla_ : vide BI.
cokhāla (OIA _cokṣa-_) pure, unmixed,
mauāla, mavāla (OIA _mṛdu-_) soft, tender.

(5) _āvā_ < OIA _-aka+va_ (_-ka_).
parāvā (OIA _para-_) of somebody else.

(6) _-ika_:
pāṁcika (OIA _pañca-_) worth five coins (a tolā), _satika_ (OIA _satya-_) real.

(7) _-ira_ < OIA _-i-ra._
goḍira (OIA _gauḍa-_) sweet, _sājirā_ (OIA _sadya-_) becoming, proper.

(8) _-isa_ < MIA _-isa, disa_ < OIA _-dṛśa._
goḍisa (OIA _gauḍa-_) sweet.

(9) *-uka* < MIA, OIA *-uka.*
itukā (OIA *iyat-*) this much, *ketukā* (OIA *kiyat-*) how much, *sājuka* (OIA *sadya-*) fresh.

(10) *-uta* < MIA *-(v)utta* < OIA *-vṛtta.*
jeutā (OIA *iyat-*) as much, *keutā* (OIA *kiyat-*) how much.

(11) *-ula* < MIA *-ulla* :
thokula (OIA *stoka-*) little, *sānula* (*sāna* < OIA *ślakṣṇa*) tiny.

(12) *-oṭī* < MIA *-uṭṭiā* < OIA *-vṛtta+ikā.*
vaṁjhoṭī (OIA *vandhya-*) barren woman.

(13) *-auta* - extension of *-uta.*
ānautī (OIA *anya-*) different, *dhaḍautā* (OIA *dṛḍha-*) capable.

(14) *-kāra* :
sācokāra (OIA *satya-*) true, real.

(15) *-kula* : diminutive.
sānakula (OIA *ślakṣṇa-*) little.

(16) *-ca* < MIA *-cca* < OIA *tya.*
āhāca (OIA *ābhā*—appearance) superficial.
kaicā (OIA *kiyat-*) related to what thing or place, etc.

(17) *-ṭa* : vide BI : pleonastic.
āṁbaṭa (OIA *āmla-*) sour, *ekaṭā*-alone,
khujaṭa (OIA *kubja-*) short, *cokhaṭa* (OIA *cokṣa-*) pure,
sunāṭa (OIA *śūnya-*) vacant, vain.

(18) *-ḍa* < *-ṭa* : vide BI.
cokhaḍā (OIA *cokṣa-*) pure, *thokaḍā* (OIA *stoka-*) short, little,
rokaḍā (OIA **raukma-*) direct, *tāṁbaḍā* (OIA *tāmra-*) red.

(19) *-ḍhā* < MIA *-ḍḍha+a* < OIA *-(va)*dhra* + *-aka* m., *-ikā* f., *-akam* n.
evaḍhā (** ayavadhra* < *īyat-*) this much,
kevaḍhā (** kaya-* < *kiyat-*) how much,
jevaḍheṁ (*yāvat-*) as much,
tevaḍha (**taya-* < *tāvat*) that much.

(20) *-tuka* : vide BII.
ekatuka- unique, unparalleled; *samatuka-* equal in weight.

(21) *-tuka* < MIA *-ttuka* < OIA *-tuka* < *-tā+uka.*
(y)itukā (*iyat-*), *jitukī* (*iyat-*).

(22) *-tula* < MIA *-ttula* < OIA **-tula* < *-tā+ula.*
ketulī (*kiyat-*), *telula* (*tāvat-*).

(23) *-ya* < MIA *-ya* < OIA *-ka.* (*y-śruti*).
garuya (OIA *guru-*) high in degree.

(24) *-ra* : vide BIII.
ujarī (OIA *ṛju-*) open, straightforward, *bocarā* (Kan. *boccu-*) tooth-less.

(25) *-la* : pleonastic.
pāṁgula (OIA *paṅgu-*) crippled, invalid; *mokalā* (OIA *mukna-*) free.

(26) *-va* < MIA *-va* < OIA *-ka* (*v-śruti*).
garuva (OIA *guru-*) important, great.

(27) *-vā* < OIA *va+ka*.
āghavā (OIA *argha-*) all, total,
āḍavā (*aḍḍa-*) horizontal.

(28) *-vaṭa* < MIA *-vaṭṭa* < OIA *-vṛtta*.
ekavaṭa—united, *kaḍuvaṭa* (OIA *kaṭu-*) bitter, *ghanavaṭa* (OIA *ghana-*) solid.

(29) *-vaḍa* : vide BI.
ekavaḍe- united, come-together,
mājivaḍā (OIA *madhya-*) situated within.

(30) *-vana* : vide BI.
tivanā (OIA *tri-*) having three leaves.

(31) *-vāra*:
haluvāra (OIA *laghu-*) soft, tender.

(32) *-sa* : vide BI.
dhaḍasā (OIA *dṛḍha-*) unimpaired, strong,

(V) Adverbs give rise to nouns.

(1) *-āra* < OIA *-kāra*:
āḍāḍa (OIA *ārta-*) trouble, effort.

(2) *-ika* :
javalika (Ar. *jivār*—BLOCH) nearness, vicinity.

(VI) Adverbs give rise to adjectives.

(1) *-āra* < OIA *-kāra* :
puḍhārī (OIA **pṛth*, or *prath-* q.v. L.P.J. p. 136) being forward,
māghārā (OIA *mārga-*) turning back.

(2) *-ita* < OIA *-i-tva* :
dhagadhagita—blazing, *lakhalakhita*—glittering, *samasamita*—sharp, acute.

(3) *-ila* < MIA *-illa* :
māgila (OIA *mārga-*) that is in the rear,
samorila (OIA *sanmukha-*) which is in front

(4) *-uta* : vide BIV.
puḍuti—that is ahead, *māgutā*—that follows.

(5) *-ula* < MIA *-ulla* :
āṁtula (OIA *anta-*) being inside.

(6) *-autā* : extension of *-ulā*.
parautā (OIA *para-*), *māghautā*.

(7) *-aula* : extension of *-ula*.
puḍhaulā.

Multiple Secondary Stem-formants

Double

(1)	*-anta-aṇa*	: *jintāṇeṁ* (OIA *jīva-*) life.
(2)	*-āra-iṇī*	: *citāriṇī* (OIA *citra-*) woman painter.
(3)	*-āra-ila*	: *mājhārila* (OIA *madhya-*) which is inside.
(4)	*-āra-iva*	: *sācāriva* (OIA *satya-*)
(5)	*āla-paṇa*	: *cokhālapaṇa* (OIA *cokṣa-*)
(6)	*-ālu-paṇa*	: *kṛpālupaṇa* (OIA *kṛpā-*) compassion, kindness.
(7)	*-ika-paṇa*	: *bolikepaṇa* (MIA *bolla-*) talkativeness.
(8)	*-iya-āla*	: *siriyāleṁ* (OIA *śira-*) the head.
(9)	*-ira-vāṇā*	: *lājiravāṇā* (OIA *lajjā-*) shameful.
(10)	*-isa-vāṇā*	: *koḍisavāṇā.*
(11)	*-ula-āla*	: *āpulāla* (OIA *ātma-*) one's own. *etulālā* etc.
(12)	*-auta-paṇa*	: *talautepaṇa* (OIA *tala-*) the being underneath, below.
(13)	*-kāra-paṇa*	: *sācokārapaṇa* (OIA *satya-*)
(14)	*-ca-vāṇā*	: *āhācavāṇā* (cf. OIA *ābhā*— appearance, outline) shallow.
(15)	*-ṭ-iva*	: *cokhaṭiva* (OIA *cokṣa-*)
(16)	*-ṭa-paṇa*	: *cokhaṭapaṇa.*
(17)	*ḍa-uka*	: *bheḍukā* (OIA *bhaya-*) timid.
(18)	*-ḍa-paṇa*	: *cokhaḍepaṇa.*
(19)	*-ḍa-sa*	: *thoḍeseṁ* (OIA *stoka-*)
(20)	*-tula-āla*	: *etulālā, tetulāleṁ.*
(21)	*-la-ika*	: *vegalika* (OIA *vyagra-*)
(22)	*-la-auta*	: *ekalautī* (OIA *eka-*)
(23)	*la-paṇa*	: *ekalepaṇa* (OIA *eka-*)
(24)	*-vāra-paṇa*	: *haluvārapaṇa* (OIA *laghu-*) tenderness.
(25)	*-sa-ṇa*	: *esaṇā* (OIA *ī-dṛśa-*)
		: *tesaṇā* (OIA *tā-dṛśa-*)
(26)	*-sa-paṇa*	: *goḍasapaṇa.*

Trible

(1) *-i-ṭha-paṇa* : *rāgīṭhapaṇa* (OIA *rāgā-*)
(2) *-ga-ụla-vāṇā* : *bhigulavāṇā* (OIA *bhī-*)
(3) *-la-āḍa-ila* : *pailāḍila* (OIA *prati-*)

The capacity of OM to extend its nominal stems by adding formative suffixes to the basic form of a noun may be illustrated by a couple of bases, though different types of suffixes and possible formations may not be exhausted here.

cokha : *cokha-ṭa, cokha-ṭa-paṇa, cokha-ṭ-iva, cokha-ḍā, cokha-ḍe-paṇa, cokh-āla, cokh-āla-paṇa,*

sāca : *sāca-paṇa, sāc-āra, sāc-ār-iva, sāc-o-kāra, sāc-o-kāra-paṇa.*

On the other hand the summary of single formative suffixes given below makes it quite clear that each one of the suffixes like *-āḍa, -āla, -ika, -ira, -iva, -ula* etc. is widely productive.

Summary of the above classification of the Old Marathi single stem-formants.

-aka A iii.
-aṇā A iii.
-ata A ii.
-anta A ii.
-ā A iii, BI.
-āī A i, BIII.
-āṭa BIV.
-āḍa, BI, III, IV, V.
-āṇa A i.
-āṇā A iii.
-āthila BII.
-āra A i, BI, IV, VI.
-ārī BI.
-āla BI, II, III, IV.
-ālā BI.
-ālu BII.
-ābai BIII.
-āva BI.
-āva A i, BIII, IV.
-āvo BIII.
-ika A ii, BI, II, III, IV, V.
-iṭa, -iṭha BII.
-iṇi BI.
-ita BII, VI.
-itī, -te A i.
-iya A ii.
-iyā BI.
-ira A iii, BI, II, IV.
-ila BII, VI.
-iva A iii, BI, II, III.
-isa BIV.
-ī A i, BI, II, III.
-īṇa BI.
-ụka A ii, BI, IV.
-uta A ii, BIV, VI.
-ula BI, II, IV, VI.
-ulā BI
-ulī BI
-uvā BI.
-eta A ii.
-aila BII.
-oṭi BIV.
-oli B III.
-ovā A i, BIII.
-auta A ii, BI, II, IV, VI.
-aula BI, III, VI.
-ka BI, II.
-kaṭa BII.
-kāra BIII, IV.
-kuṭa BI.

-kula BI, IV.
-ga BI.
-ca BII, IV.
-cā BII.
-ṭa BI, II, IV.
-ṭi Ai.
-ṭhā BI, II.
-ṭhī BI.
-ḍa BI, II, IV.
-ḍā BI
-ḍī BI, III.
-ḍeṁ BI.
-ḍha BIV.
-ḍhā BII.
-ṇa A i, BI.
-ṇā A iii, BII.
-ṇī A i, BI.
-ṇeṁ A i.
-tā BI.
-tī BI. . .
-tuka BII, IV.
-tula BIV.
-paṇa BI, III.
-ya BIV.
-(*y*)*āla* BII.
-ra, -rā BIII, IV.
-rūṁ BI.
-la BI, II, IV.
-laga BII.
-lai BI.
-va BIV.
-vaṭa, -ṭī BI, IV.
-vaḍa, -ḍā BI, IV.
-vaṇa—BIII.
-vaṇī BI.
-vana BI, III, IV.
-vā BI, II, IV.
-vāra BIV.
-sa BI, II.
-sā BI, IV.
-sura BII.
-seṁ BI.

THE STRUCTURE OF SPEECH-SOUNDS*

By

P. C. GANESHSUNDARAM

[In this paper, a short review of the existing ideas about vowel-structure is briefly outlined and a general equation for any speech-sound, vowel or consonant, is given, taking the classical work of ESSNER on the structure of the vowels and of TOLMIE on the vibrato as the starting point, in the wake of the alpha-phonoid theory of Prof. C. R. SANKARAN.]

Many papers have appeared on this subject since the time of HELMHOLTZ.[1] In any of these papers, dealing in particular with vowel-structure, it is always observed that :

(1) The 'vowel' is implicitly assumed to be fundamentally different from the 'consonant'.

(2) Only some one or other aspect of a 'vowel' sound has been looked at and 'explanations' for that aspect offered.

It should be observed at the very outset that every 'explanation' is ultimately nothing but a 'classification'.[2] Therefore, in order that the 'explanation' may be more and more precise, there must be at hand a more and more thorough 'scheme of classification' which, while attempting to pay greater and greater attention to the minutest details, is yet based on a wide and comprehensive philosophical background.

If ever we fail in our enquiry to arrive at a precise 'explanation' of such 'irregular' phenomena as the speech-sounds, it is because we do not have at our disposal the right 'scheme of classification' that is wide enough to comprehend all the observed and observable facts. Any such 'scheme of classification', for its validity, must be philosophically and logically consistent within its own domain.

* I acknowledge my indebtedness to Prof. C. R. SANKARAN, for the inspiration and guidance in writing this paper, and to Shri. B. CHAITANYA DEVA for drawing my attention to TOLMIE'S work on the vibrato.

1. Cf. C. R. SANKARAN, Deccan College Monograph Series, No. 7, 1951; P. C. GANESHSUNDARAM, A Qualitative Definition of the Perfect Vowel and the Perfect Consonant, BDCRI, vol. 14, in press; P. C. GANESHSUNDARAM, Some Mathematical approaches to the Electro-acoustical Analysis of Speech-sounds, BDCRI, vol. 17, 1955, pp. 27-41.

2. In this connection I am indebted to Prof. SANKARAN for drawing my attention so kindly to the following profound statement of Sir Charles SHERRINGTON : "The final cause will stay as item of classification, but not as explanation." (*Man on his Nature*, Cambridge, at the Univ., Press, 1953, p. 118).

When we have certain 'facts' that fit into such a consistent 'scheme', the latter is precisely the 'theory' that 'explains' those facts.

In the present paper, however, only the fitting up of facts into the various schemes is shortly reviewed. No attempt is made here to analyse the 'schemes' themselves.[3]

In the earliest attempts at explaining the vowel-structure, the regularity of the vowel and vowel-like wave-forms and the irregularity of the non-vowel and consonantal wave-forms were first observed and a broad classification was made in describing the vowels as 'musical tones' and the consonants as 'noises'.[4]

Further work was directed at finding the frequency composition of vowel-sounds. It was observed that for different vowels uttered at the same pitch certain higher partials tended to be concentrated at certain specified regions (which were different for different vowels) and, for the same vowel, irrespective of the pitch of the voice, the regions characteristic of that vowel tended to remain unaltered.

The explanations offered to account for this were as under :[5]

The cavity of the mouth is tuned to different frequencies for different vowel sounds as a result of which, from the complex tone having the fundamental and a large number of harmonics generated by the vocal cords, certain frequencies are re-enforced. The component frequencies are all exact multiples of the fundamental (WILLIS, WHEATSTONE).

Each vowel sound is characterised not by a single fixed frequency but by a fixed region of resonance which is not dependent on the fundamental tone of a vowel sound (The characteristic resonance region theory —HELMHOLTZ, D. C. MILLER, J. OBATA and STEINBERG).

3. For an attempt at giving a short account of such 'schemes', if not an analysis, cf. P. C. GANESHSUNDARAM, Some Mathematical Approaches, etc., op. cit.

4. In the present review only the work of modern scientists starting from HELMHOLTZ is considered; the qualitatively and intuitively observed descriptions by ancient savants like Pāṇini and Tolkāppiyar are not discussed here.

It is not to be mistaken that we dismiss intuition altogether from science; for, it is at the levels of intuition Prof. SANKARAN speaks of the entry of the *time-less* 'quality' into 'time-order' which serves as the basis of all *measurement*, being reflected at every *instant* (i.e., a 'point-vibration') even in his latest exposition of the alpha-phoneme theory, BDCRI, vol. 14, pp. 15 and 16.

In this context we are also reminded of the following telling words of CAJAL, the gifted Spanish neurologist : "one wonders whether what we disdainfully term 'instinct' (Bergson's 'intuition') is not as Jules Fabre claims, life's crowning mental gift" (As quoted by Sir Charles SHERRINGTON, op. cit., pp. 108-109).

5. I am grateful to Shri. A. D. TASKAR for the fruitful discussions in formulating what follows in the text above.

Cf. in this connection, C. R. SANKARAN, DCMS, No. 7, pp. 25 and 26.

The vocal cords act only as an agent for exciting the transient frequencies which are characteristic of vocal cavities. A puff of air from the glottis sets the air from these cavities into vibration. This soon dies out until it is started anew by a second puff. These puffs do not necessarily follow each other periodically (Inharmonic theory —HERMANN).

It was, however, observed by SCRIPTURE, GEMELLI and others (who studied wave-forms of speech) and G. Oscar RUSSELL and others (who studied the dimensions and movements of the speech organs by means of X-ray photographs), that:

(1) the filtering out of the characteristic frequency regions did not alter the vowel character, although it altered the musical quality.[6]

(2) The vowel (the *physical 'profile'*) is not the sum of a few discrete free vibrations as they are supposed to be, but an integration of an infinite number of such vibrations differing infinitely little from one another.[7]

(3) The 'dimensions of the cavities' are less important in comparison with the 'place of articulation', in giving the characteristic quality to a vowel.[8]

The general (but perhaps undefined) attitude of the present-day workers on speech-sounds, particularly the sound-spectrographists, seems to be that any theorising attempting to explain their peculiar frequency composition is futile and that it is enough, for all practical purposes, to know in which frequency regions there is a great concentration of frequencies carrying considerable energy.

Also, the physiological workers, on their part, seem to have assumed that the dimensions of the cavities are 'less important' in comparison with the 'articulation place' (and therefore, even, 'unimportant').[9]

From what follows, it will be obvious that not only the 'articulation place' but also the 'dimensions of the cavities' are, in addition to being *sufficient* for the production of speech-sounds, also *necessary* to allow for the variation of pitch and intensity that take place during the speech process without affecting the 'individual character' of speech-sounds.

In this connection it is of interest to note the work particularly of

6. SCRIPTURE's experiment as described by Alexander WOOD, *A Text-Book of Sound*, p. 360.
7. C. R. SANKARAN, DCMS, No. 7, p. 25.
8. Ibid., pp. 20-21.
9. As reflected in Pierre DELATTRE's, Physiological Interpretation of Sound Spectrograms, PMLA, vol. 66, No. 5, although many statements made in his paper suggest the contrary.

H. D. BOUMAN and P. KUCHARSKI,[10] K. N. STEVENS, S. KASOWSKI and C. Gunnar M. FANT,[11] Ch. ESSNER[12] and J. R. TOLMIE.[13]

BOUMAN and KUCHARSKI have attempted to synthesise artificial vowels by the combination of two simple tones, one corresponding to each formant; they have also studied the effects produced by altering the relative intensities of the formants. STEVENS, KASOWSKI and FANT have studied the possibility of producing any vowel sound by altering the constants of the electrical circuit.[14]

ESSNER's paper gives an accurate picture of what would take place in an acoustic system corresponding to BOUMAN and KUCHARSKI's electrical model. But it does not account for the spectral distribution of several frequencies over the formant regions as is actually the case. The formant frequencies in ESSNER's formulas are isolated frequencies and therefore they correspond not so much to the vowels produced by the human voice as to those synthesised by BOUMAN and KUCHARSKI.

One answer, however, is found in ESSNER's paper to counter the assumption of the physiological investigators that the dimensions of the cavities are less important. The answer is evident in the formula :

$$N_0 = \frac{1}{\sqrt{RU}} \cdot \frac{V}{2\pi} \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where, N_0 is the natural frequency of the front cavity, R, the acoustical resistance of the orifice of the front cavity which opens up into the external acoustic medium, U, the volume of the front cavity and V, the velocity of sound. A similar formula for the back cavity is given by :

$$N_0' = \frac{1}{\sqrt{R'U'}} \cdot \frac{V}{2\pi} \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

It is evident from (1) that the resonant frequency No depends on the volume U (dimensions of the cavity) and is not independent of it. If the vowel character were independent of the dimensions of the cavity the equation should be independent of U.

The physical manifestation of the 'articulation place' is the 'acoustic resistance', 'R'. We see here that, if the dimensions are greater, the

10. H. D. BOUMAN and P. KUCHARSKI, *Synthèses de Voyelles à moyen de deux Sons Simples*, ANPE, tome 4, pp. 90-111.
11. K. N. STEVENS, S. KASOWSKI and C. Gunnar M. FANT, An Electrical Analog of the Vocal Tract, JASA, vol. 25, pp. 734-742.
12. Ch. ESSNER, *Recherches sur la Structure des Voyelles Orales*, *ANPE*, vol. 20, pp. 40-77.
13. J. R. TOLMIE, Analysis of the Vibrato, JASA, vol. 7, pp. 29-36.
14. It appears unnecessary to have such complicated networks. If simultaneous frequency and amplitude modulation on BOUMAN and KUCHARSKI's formants were effected by different frequencies, a fairly accurate reproduction of vowel sounds may be obtained.

'acoustic resistance' (characteristic of the 'articulation place') should be smaller such that the product, 'RU', remains the same, thus maintaining N_0 constant at the original value.

Now, ESSNER defines the "formant" frequencies as the "coupling frequencies", N_1 and N_2, which are common to both the cavities, such that :

$$\sqrt{N_1 N_2} = \sqrt{N_o N_o'} \quad .... \quad ... \quad ... \quad (3)$$

ESSNER, however, leaves the higher "formants" (the 3rd, 4th, etc.), unmentioned. Perhaps, in his own terms, they could as well be explained in terms of frequencies corresponding to additional cavities which may be either fully or partially formed within the pharyngo-buccal and nasal cavities.

At all events, it must be remarked that ESSNER'S equations[15] whicn provide by far the best descriptions of the vowel vibrations, lack in one fundamental detail (mentioned above), viz., that the "formant" frequencies are therein represented as single frequencies and not as a spectral distribution of frequencies in the "formant regions", which is actually the case for the vowel sounds produced by the human voice.

J. R. TOLMIE, in his paper on the vibrato, has indirectly paved the way for a possible explanation of the vowel sounds in the wake of which we may consider the voice frequency and the "Essner formants" (i.e., the static formants) as being modulated in frequency and amplitude simultaneously by a series of simple tones of different frequencies and different phase differences, yielding Bessel coefficients which are themselves functions of these frequencies, thus suggesting that any speech-sound is, instant to instant, a different one, the spectral distributions at any instant being different from that at any other. The implications of this statement are far-reaching and they could be tackled only at the philosophical level.[16]

15. It is a matter of regret that the 2nd part of ESSNER's paper could not appear in the ANPE, since the ANPE stopped its publication with the 20th volume. We were informed, about this unfortunate stoppage, by the editor Miss L. KAISER, in a letter to Prof. SANKARAN in 1950.

16. Cf. C. R. SANKARAN, op. cit., BDCRI, vol. 14. Prof. SANKARAN's attempts at the construction of a geometrical physical theory at the hypothetico-deductive level have the essence of the above statement, inductively arrived at here, as one of the derivative consequences of the theory.

In connection with the ideas of 'instants', 'regularity' and 'irregularity', cf.:

"Now each 'event' constitutes a type of regularity in a deeper sense of the term, which is *ultimate* and *non-causal*." (C. R. SANKARAN, A Note on the Epistemological Implications of the Alpha-phoneme Theory, BDCRI, vol. 14, p. 39).

Thus, in the wake of ESSNER and TOLMIE, taking ω, ω_o and $\omega_0{}'$ as the angular frequencies corresponding to the voice, the front cavity and the back cavity, respectively, we have the general modulation equation that specifies any speech-sound (vowel or consonant) :[17]

$$f(t) = [\,1 + m_1 \cos(\mu_1 t + \theta_1 + \phi_1) + m_2 \cos(\mu_2 t + \theta_2 + \phi_2) + \ldots\ldots\,]$$

$$\times \{ \sum_{n=1}^{\infty} \sin[\, n\omega t + k_1 \sin(\mu_1 t + \theta_1) + k_2 \sin(\mu_2 t + \theta_2) + \ldots\ldots\,] \}$$

$$+ \sum_{p=1}^{\infty} \sin[\, p\,\omega_o t + h_1 \sin(\mu_1 t + \theta_1) + h_2 \sin(\mu_2 t + \theta_2) + \ldots\ldots\,]$$

$$+ \sum_{q=1}^{\infty} \sin[\, q\,\omega_o{}' t + p_1 \sin(\mu_1 t + \theta_1) + p_2 \sin(\mu_2 t + \theta_2) + \ldots\ldots\,] \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

An expansion of the above equation and substitution of the correct values of $\mu_1, \mu_2, \ldots, \theta_1, \theta_2, \ldots, \phi_1, \phi_2, \ldots, \omega, \omega_o, \omega_o{}', \ldots, m_1, m_2, \ldots, k_1, k_2, \ldots h_1, h_2 \ldots$ etc., within any specified time interval, however small, it is expected, will give any speech sound, vowel or consonant.

17. This implies that the 'vowels' and the 'consonants' are essentially not different from each other, except on arbitrary acoustico-articulatory grounds. Whatever difference there is, acoustically, is in the nature and degree of the change in the constants (parameters) involved in the equation.

If all the parameters remain constant during a speech process, we obtain a vowel sung at constant pitch with constant amplitude (Cf. in this connection, P. C. GANESHSUNDARAM. A Qualitative Definition of the Perfect Vowel and the Perfect Consonant, BDCRI, vol. 14, in press).

An explanation for the vowel character remaining unaltered, as observed by SCRIPTURE, in his experiments in which various frequency regions were filtered off, is found in terms of the presence of such a modulation, which along with the non-linearity of the ear supplies almost all the frequencies that had been originally filtered off.

[Instead of ω_0 and $\omega_0{}'$ in the equation, we may take ω_1 and ω_2 The angular frequencies corresponding to the 1st and 2nd formants].

DOCTRINE OF KARMA IN POPULAR JAINISM

By

H. G. NARAHARI.

The doctrine of Karma is an accepted principle even in popular Jainism which, like popular Hinduism, is also full of conceptions which appear to be in consistent with the regular doctrine enunciated in the Upaniṣads. We read even here that the good and bad which man experiences now is only the consequence of his past conduct, and that, if he is miserable now, there is no escape from it and he has to pay his penalty. Neither the personal appearance of a man, his family, his character, his knowledge, nor his service to others determines his present as, we are told,[1] his merit of the past which, like trees, unfailingly yields its fruit:

नैवाकृतिः फलति नैव कुलं न शीलं
विद्यापि नैव न च यत्नकृतापि सेवा ।
भाग्यानि पूर्वतपसा खलु सञ्चितानि
काले फलन्ति पुरुषस्य यथैव वृक्षाः ॥

If King Siddharāja ruled over a mighty kingdom, he enjoyed only the reward for his past merit;[2] and so was Puṇyasāra endowed with the power to bring painted figures to life.[3] As it is in the case of merit, so is it in the case of evil also. Thus the ascetic Kanthaḍi is aware that his tertian ague and fever is only what he earned in his previous lives, and that there is no other method of exhausting them save enduring them as long as they should go on. He says to the Sapādalakṣa King:[4]

"Let my diseases come upon me, whatever they may be, that were earned in previous lives,
I wish to go clear of debt to that Supreme Place of Śiva.

Action, the consequences of which have not been endured, is not exhausted even in hundreds of crores of *kalpas;* we must of necessity suffer the consequences of the deeds that we have done, whether they be good, or whether they be evil."

1. *Prabandhacintāmaṇi* of Merutunga (Trans. C. H. Tawney, Calcutta, 1901), p. 114. The verse occurs in Bhartṛhari, *Nītiśataka*, verse 97.
2. *Prabandhacintāmaṇi*, *loc. cit.*
3. *Ibid.*, p. 180.
4. *Ibid.*, p. 25; the first verse is cited from the *Śivapurāṇa*.

And, to the workman Devapāla, it is the store of his merit in past lives that gave him the privilege to espy an image of Jina mid-stream a river in spate. The sight makes him cry out:[5]

अहो भाग्यमहो भाग्यमहो मे पुण्यसङ्गमः ।
अहो मे कर्मसामग्री कटरे कर्मलाघवम् ॥

Side by side with such ideas we also read that devotional worship can destroy Karma. It is thus laid down in the *Āvaśyakavandanāniryukti*:[6]

> "He, who, knowing for certain that the virtues of Tīrthakaras do not exist in their pictures,
> Worships a picture, because it represents a Tīrthakara, obtains great destruction of Karman.
> If men worship a *liṅga* appointed by a Jina, there is great destruction of Karman,
> Even if a man worships what is devoid of merit, it tends to spiritual purification."

Transference of merit is possible. We read of King Bhoja who, pleased by Māgha's hospitality, transfers to him whatever merit was earned by him by virtue of building the Bhojasvāmin temple.[7]

The belief also prevails that the relation of father and son continues for more than one existence. King Bhīma, Lord of the Rakṣas, recognises in his adversary Meghavāhana his own son in a former incarnation, and asks him to accept him as his father even then:[8]

अथ रक्षपतिर्भीमो निषण्णस्तत्र पर्षदि ।
उच्छायालिङ्ग्य रभसान्मेघवाहनमब्रवीत् ॥
पुष्करद्वीपभरतक्षेत्रो वेताढ्यपर्वते ।
प्राग्भवे काञ्चनपुरे विद्यद्दंष्ट्रो नृपोऽभवम् ॥
तस्मिन्भवे ममाभूस्त्वं तनयो रतिवल्लभः ।
अत्यन्तं वल्लभो वत्स साधु दृष्टोऽसि सम्प्रति ॥
तदेवं सम्प्रत्यपि मे पुत्रोऽसि परिगृह्यताम् ।
सैन्यं मदीयं त्वदीयमथान्यदपि यन्मम ॥

In the *Upadeśacintāmaṇi* of Ratnaśekharasūri[9] we read that the story of *Jina* is capable of saving its listener from the bondage of *saṁsāra*:

5. *Kathākośa* (Ed. by Pandit Jagadis Lal Shastri, Lahore, 1942), p. 2.
6. cited in *Prabandhacintāmaṇi*, p. 161. Leumann finds these two verses in the *Avaśyakaniryukti*, XII. 31 f.
7. *Ibid.*, p. 49.
8. *Jaina Rāmāyaṇa* of Hemacandra (Ed. by Jagannath Sukla, Calcutta, 1874), p. 7.
9. Adyar Library Ms. (XL. C. 60), fol. 16 a.

जे संसारपरित्ता गुरुसुभत्ता गुणे सु आवुत्ता ।
ते सिंचिय जिणवुत्तं तत्तं परिणमइ चित्तम्मि ॥

Similar modifications of the regular doctrine abound in works like the *Prabhāvakacarita*[10] of Candraprabhasūri and the *Nāgakumārakāvya*[11] of Malliṣeṇa.

Fate (*Divva, Daiva, Vihi, Vidhi*), the inviolable power with which man has often to contend, is quite familiar to this literature which abounds in allusions to its supremacy:[12]

कुमुदवनमपश्रि श्रीमदम्भोजषण्डं
त्यजति मुदमुलूकः प्रीतिमांश्चक्रवाकः ।
उदयमहिमरश्मिर्याति शीतांशुरस्तं
हतविधिलसितानां ह्री विचित्रो विपाकः ॥[13]

अत्थो विज्जा पुरिसत्तणं च अन्नाइं गुणसहस्साइं ।
दिव्वायत्ते कज्जे सव्वाइं नरस्स विहडंति ॥

नग्घंति गुणा विहडंति बंधवा वल्लहा विरज्जंति ।
ववसाओ न समप्पइ नरस्स दिव्वे पराहुत्ते ॥

विहिणा जं चिय लिहियं नलाडवट्टीए तेण दइवेण ।
पच्छा सो वि पसन्नो अन्नह करिउं न-हु समत्थो ॥

विहिविहियं चिय लब्भयि अमयं देवाण महुमहेलच्छी ।
रयणायरंमि महिए हरस्स भाए विसं जायं ॥

But, almost as often, man's courage (*sāhasa*), which can combat and even worst this force from without, is eulogised:[14]

थरहरइ धरा खुब्भंति सायरा होइ विम्हलो दइवो ।
असमववसायसाहससंलद्धजसाण धीराणं ॥

तं किं पि कम्मरयणं धीरा ववसंति साहसवसेणं
जं बम्महरिहराण वि लग्गइ चित्ते चमक्कारो ॥

धीरेण समं समसीसियाए रे दिव्व आरुहंतस्स ।
होहिइ किं पि कलंकं धुव्वंतं जं न फिट्टिहिइ ॥

न महुमणस्स वच्छे मज्झे कमलाण नेय रवीरहरे ।
ववसायसायरे सुपुरिसाण लच्छी फुडं वसइ ॥

10. Published in the N. S. Press, Bombay, 1909.
11. Adyar Library Ms., XXXVI. A. 8.
12. *Prabandhacintāmaṇi*, p. 50; *Vajjālaggam* (Ed. by N. A. Gore, Poona, 1947), pp. 27 ff.
13. This is the same as *Śiśupālavadha*, XI. 64.
14. *Vajjālaggam*, pp. 24 ff.

A much milder attempt to minimise the terrors of Fate is to identify it with Karma. The *Subhāṣitaratnasandoha* of Amitagati[15] thus says:

भवितव्यता विधाता कालो नियतिः पुराकृतं कर्म ।
वेधा विधिस्वभावो भाग्यं दैवस्य नामानि ॥
यत्सौख्यदुःखजनकं प्राणभृता संचितं पुरा कर्म ।
स्मरति पुनरिदानीं तद्दैवं मुनिभिराख्यातम् ॥
पुरुषस्य भाग्यसमये पतितो वज्रोऽपि जायते कुसुमम् ।
कुसुममपि भाग्यविरहे वज्रादपि निष्ठुरं भवति ॥
सुखमसुखं च विधत्ते जीवानां यत्र तत्र जातानाम् ।
कर्मैव पुरा चरितं कस्तच्छक्नोति वारयितुम् ॥
दैवायत्तं सर्वं जीवस्य सुखासुखं त्रिलोकेऽपि ।
वुद्धेति शुद्धधिषणाः कुर्वन्ति मनःक्षतिं नात्र ॥
व

As in the case of popular Hinduism, the idea behind the "modifications" of the Upaniṣadic doctrine of Karma is that there is more than one way of freeing oneself from it. Fate is often the same as one's past Karma; but, even when it is different, man can always conquer it by his courage (*sāhasa*).

15. Ed. Kāvyamālā 82, Bombay, 1903, pp. 45 ff.

CHALCOLITHIC BLADE INDUSTRY OF MAHESHVAR
(Central India)
and
A NOTE OF THE HISTORY OF THE TECHNIQUE

By

B. SUBBARAO

I

Introduction:

During the excavations at Maheshvar (Nimar District of Madhyabharat), conducted by the Deccan College Research Institute and the Baroda University, with the financial assistance from the Universities of Poona and Bombay, a rich and highly specialized Microlithic blade industry was discovered.[1] In the following pages it is proposed to give a study of more than 7000 specimens of cores, flakes and tools found in the excavation. This large material from the "factory site" enabled a complete study of the entire technique of manufacture from the nodule to the finished tool. At the same time, the study of some of the collections from Western Asia and Europe brought to light the existence of a similar technique with a wide distribution and probably with its origin in Western Asia.[2] A note on the character and distribution of this technique is appended to the main study of this Blade Industry from the Narmada Valley.

Maheshvar

To understand the stratigraphic position of this industry, a short summary of the excavation will not be out of place. Maheshvar is located

1. A short interim report of these excavations has been published already. See SANKALIA, H. D., SUBBARAO, B. and DEO, S. B. "Archaelogical Sequence of Central India", *South Western Journal of Anthropology*, New Mexico University, IX, 4. 1953.
2. I am very grateful to the Director of the London University Institute of Archaeology and to Prof. F. E. ZEUNER and Dr. Kathleen KENYON for permission to publish some material from their collection. I am also obliged for permission to publish the photographs to the Trustees of the British Museum and Frank WILLETT of Manchester Museum. Finally, my thanks are due to Prof J. G. CLARK, M. C. BURKITT, Dr. John WAECHTER, W. C. BRICE, Col. D. H. GORDON and Frank WILLETT for valuable advice during the course of my study in London. The fine drawings included in this paper have been prepared by Ramesh J. KHATRI of the University Department of Archaeology.

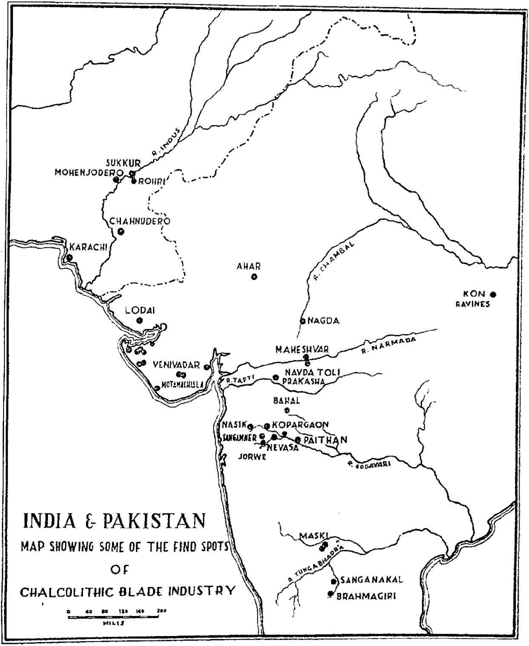
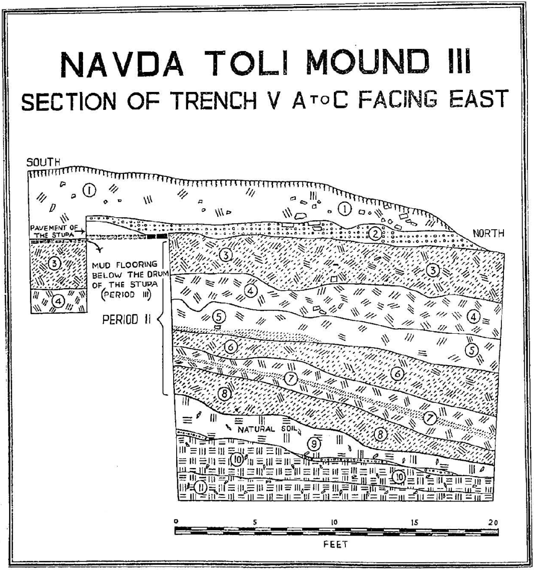

INDIA & PAKISTAN
MAP SHOWING SOME OF THE FIND SPOTS
OF
CHALCOLITHIC BLADE INDUSTRY
MILES
R. INDUS
SUKKUR
MOHENJODERO
ROHRI
CHAHNUDERO
KARACHI
AHAR
R. CHAMBAL
KON
RAVINES
NAGDA
LODAI
MAHESHVAR
R. NARMADA
VENIVADAR
NAVDA TOLI
PRAKASHA
MOTAMACHIALA
R. TAPTI
BAHAL
NASIK
KOPARGAON
SANGAMNER
PAITHAN
NEVASA
JORWE
R. GODAVARI
MASKI
R. TUNGABHADRA
SANGANAKAL
BRAHMAGIRI

Fig. 1.



NAVDA TOLI MOUND III
SECTION OF TRENCH V A TO C FACING EAST
SOUTH
NORTH
PAVEMENT OF THE STUPA
MUD FLOORING BELOW THE DRUM OF THE STUPA (PERIOD III)
PERIOD II
NATURAL SOIL
0
5
10
15
20
FEET

Fig. 2.

on the north bank of the river Narmada, while on the opposite bank, there is another site near the small village of Navdatoli. On account of their location on either bank of the river, the results of both the excavations have been integrated, so that a continuous sequence of cultures could be studied. This ancient city, probably Mahishmati of the Puranic tradition, is located on the old highway from the Gangetic basin to the Deccan through Ujjain. The following sequence can be reconstructed on the basis of the results from ten large trenches, dug on both the sides of the bank. (Fig. 2).

Period I

An industry characterized by the presence of 'side', and 'end' scrapers of chert and jasper lies at the base, but is stratigraphically unrelated to the later cultures. Such an industry from Hoshangabad and Narsingpur has been described as "Proto-Neolithic" by T. T. PATERSON. But it bears very close resemblance to those from the Pravara and Godavari Valleys found by Dr. H. D. SANKALIA and Prof. Von Furer HAIMENDORF.

Period II

It is succeeded by a Chalcolithic (Proto-Historic) Culture, characterized by painted pottery with black designs on red and cream ware, mace-heads with hour-glass section and a little copper and bronze. The Blade Industry, the subject of this paper is associated with it. This phase can be dated stratigraphically to the first half of the I Millenium B.C. or earlier, with a *terminus post quem* of about 500 B.C., on account of its position below the deposits yielding the Gangetic Valley Northern Black Polished ware.

Period III

An Early Historic period from about 500 B.C. to 500 A.D., characterized by the N.B.P., early punch-marked and cast coins, iron and the Red-and-Black pottery, usually associated with 'Megalithic monuments' in the South.

Blade Industry

The mounds on the south bank of the river were comparatively richer and hence most of the material for the study comes from that area. On the north bank, only one mound yielded this material, but due to fine overlaps of the later periods on either side, the correlation is quite reliable.

Of all the areas, the Mound I is unique as the chief 'factory' site. Even during the surface exploration this feature was noticed, but the excavation more than fulfilled our calculation. The trench (40 × 20 feet)

gave in all about 5411 specimens including waste products. Their distribution in the different layers (See Table I) shows their stratigraphic position. In the first two layers, belonging to Period III, they seem to be derived from the earlier deposits or may represent stray survival or later use. The habitation started on the black soil and no specimens of the earlier phase were found. But in layer 8, a large number of specimens show discolouration and a glossy surface, with traces of rolling. But in view of the limited evidence, it is difficult to assume an earlier phase, though there is nothing improbable in such a sequence.[3]

The small trench (Trench II 15×8 feet) on the Mound I, also yielded similar evidence of a manufacturing site. A group of 689 specimens were found at one place, of which nearly 630 were irregular thin flakes. But unfortunately, no evidence of anvil or hammer stone were found to locate a chipping site.

The other two mounds (Trenches III, IV and V) were not so rich. In Trench III, the huge porcupine holes and the flood (the evidence of which was quite clear), seem to account for the dearth of large deposits of this period. In Trenches IV and V, both laid along the sloping surface of the mound, the evidence was not taken into consideration, owing to the small quantity of materials.

Finally, the Trench III on Mound V at Maheshvar, on the opposite bank, yielded about 142 specimens, mostly concentrated in the lower levels.

Method of study

The whole material from the various trenches was first classified into cores, irregular or asymmetrical flakes, regular or parallel-sided flakes, flakes with longitudinal ridges showing signs of alternate flaking, called "Crested ridges" and finished tools, showing definite evidence of secondary retouch. Advantage was taken of the large number of waste products and abandoned nodules and cores to study the entire technique of manufacture in all the stages. A few selected cores from the surface were also utilized to elaborate certain details noticed on the excavated specimens.

Technique

The most important feature of this industry was the existence of a large number of cores with extensive and shallow ripple flaking with overlapping scars and the number of flakes with longitudinal crests.

3. At Dongargoan, about 4 miles south of Navdatoli, a few fluted cores and one lunate were found without any associated pottery. Similarly the writer noticed that specimens from the excavations at Tripuri, by Dr. M. G. DIKSHIT of the Saugor University show the same physical condition.

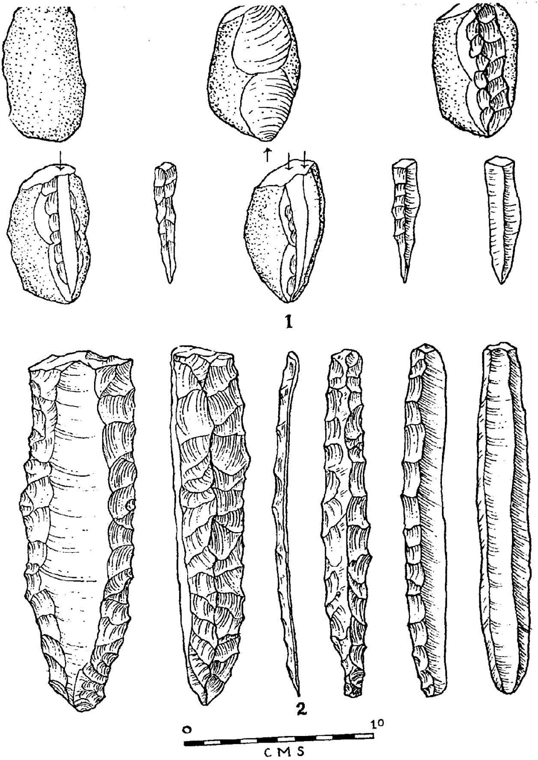


Fig. 3. (1) An idealised diagram to show the stages of manufacture after CHEYNIER and BARNES.
(2) Core and its bye-products from Le Grand Pressigny. After CLARKE and MORGAN.

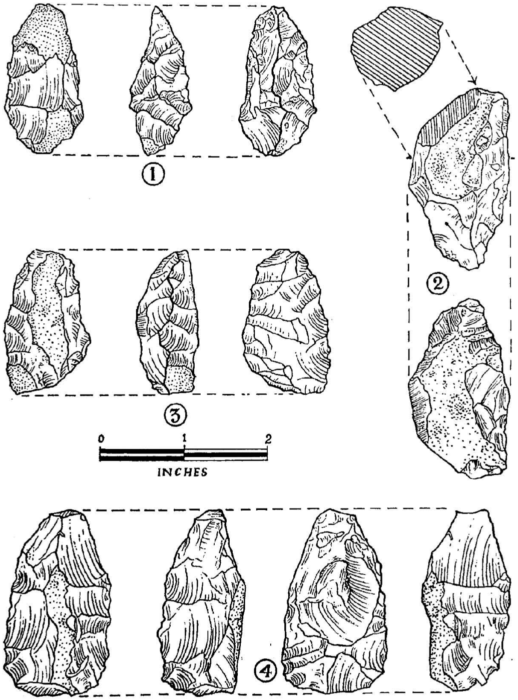


Fig. 4. Nodules in the I stage of manufacture—Dressing, Maheshvar.

BARNES,[4] has given us a brilliant survey of the methods of blade production, an industrial tradition that emerges in the Upper Palaeolithic and dominates the Mesolithic and Neolithic and even the later periods. In association with A. CHEYNIER,[5] he described another technique, viz., the technique of crested guiding ridges, which seems to be the one employed at Maheshvar. This technique has been very well explained in an idealised diagram (Fig. 3. No. 1) by them. It is remarkable that this technique, usually employed for the mass production of large blade flakes, should have been used even in the case of comparatively smaller nodules, available in Central India and the Deccan.[5a] As the following account will show, the elaborate preparation of the core and the ridge is so striking that it confirms the existence of an industrial tradition to which it belongs. Fortunately, the abundant evidence of its distribution in India and the application of this technique in areas, where raw material occurs in large nodules of chert and flint (as at Sukkur and Rohri (in Pakistan) and Raichur (Hydrabad, Deccan) and the neighbouring areas, helps us to account for its use in India. Besides, the most significant feature is the association of this industry (so far as we know), only with the Chalcolithic cultures beginning with the Indus Valley Civilization.

Dressing the nodule

As already said, a large number of cores showed extensive ripple flaking on the surfaces, not used for removing blades. Besides, a number of semi-cylindrical and irregular cores had natural faults and hence were abandoned. Hence the first stage may be described as the dressing of the nodule by carefully removing the outer cortex, leaving the core as intact as possible, since the size of the nodule is very small.[6] Actually, some of the abandoned nodules show the remnants of cortex.

4. BARNES, A. S. "The technique of Blade production in Mesolithic and Neolithic times", *Proceedings of the Prehistoric Society*, XIII, 1947.
5. CHEYNIER, A. and BARNES, A. S. "Les Lames a Section Triangulaire et les Pieces a crete", *Congress Prehistorique de France, Douziemme session*, 1936, pp. 630-637.
5a. SANKALIA, H. D., and DEO, S. B. "*Excavations at Nasik and Jorwe*", Poona, 1955.
6. This process involves fine pressure flanking and sometimes is very similar to that on the Egyptian and Danish flint tools. But it is not employed on the tools. It can be compared with what the writer noticed at a modern bead workshop in Cambay on the West coast of India. But there is one essential difference in the chipping process. The nodule is held at the pointed tip of an iron bar fixed obliquely in the ground. While the pressure is exerted from the otherfree end of the nodule with a light hammer of wood or horn, the flake comes off at the point where the iron tip of the anvil impinges on the stone. The main object of this process is to remove the cortex and to get the required shape. Depending on the angle at which the nodule makes with the anvil tip, the flake is narrow and elongated, or short and rounded. On account of the sharpness and strength of the tip, these invariably show deep bulbs.

Figure 4.

No. 1 shows an irregular worked nodule with a semi-triangular section. The lower face shows the cortex and the shallow flaking. There is no convenient striking platform. On account of its faulty structure, it seems to have been abandoned.

Nos. 2 and 3 are nodules of agate with the cortex entirely removed on one face by shallow pressure flaking. The other face retains cortex.

No. 4 is a nodule of chert, which is generally rare in this assemblage.

Preparation of the ridge

This stage, which is essentially a continuation of the first, results in a fine ridge with alternate flaking. This is achieved by removing a series of flakes along the logitudinal axis, but at right angles to its face along one edge. From the negative scars of these flakes, another series of flakes are taken on the opposite side. This has the effect of truncating the earlier flake scars and giving a crest with a zigzag edge. Hence, particularly in the cuboid nodules, crests appear at the corners. But in some cases, it was noticed that there was a crested ridge running along the centre of the face. The finest example of a core with two ridges in the corner is illustrated in Fig. 5. No. 11. In this specimen, full of structural hollows, only three long flakes were taken and then it was abandoned. All the three other sides show fine presure flaking. A core with a central crest is illustrated in Fig. 5. No. 10. In the excavation, about 115 flakes with such crests were found suggesting the employment of this technique.

Are they rejuvenating flakes?

These crested flakes with triangular sections have been described by various authors as *lames de degagement* (detaching flake). A close look at the specimens immediately shows definite evidence of truncation of one series of flake scars. There is no doubt either about their being done on the core before the removal of the flake from it. A very careful study of the flakes shows that they cannot be mere rejuvenating flakes from normal blade cores. On a normal core with a single platform, one can see fluting of parallel ridges as in Fig. 6,a. The resulting flake scars always show ridges parallel to the main axis. But, if the platform is changed to another face, perpendicular to the original one, the second stage of flaking from the new platform results in one series of scars running at right angles to the other, as in Fig. 6. b. Its product will be a flake with one longitudinal ridge parallel to the main axis on one half of the face and a series of truncated remnants of the previous flake scars

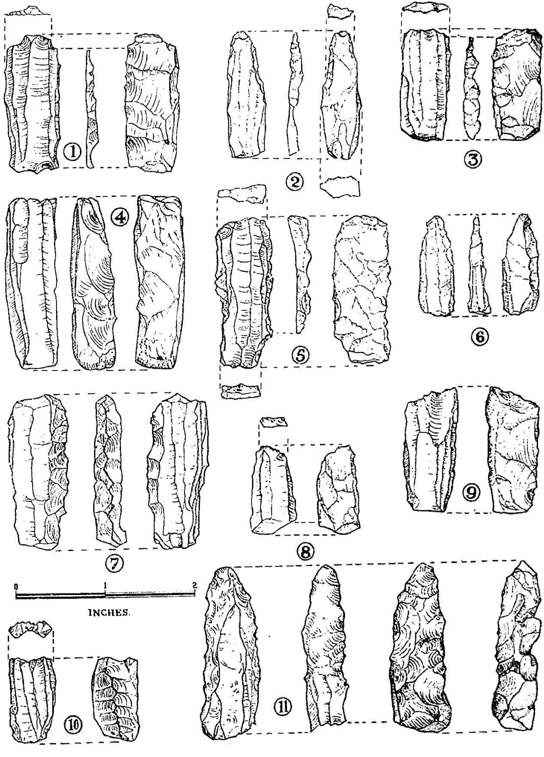
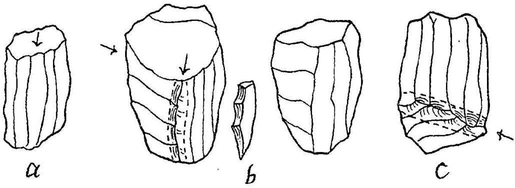


Fig. 5 Cores in stages II and III, Maheshvar.



Ffg. 6. An idealised diagram to show the effect of flaking on normal blade cores.

taken from the first platform on the other half. But on a roughly cubical or cuboid core, if the original platform of the first series were used for removing the fresh series from the negatives of the first series, an edge with a crest can again arise, as in Fig. 6, c. The type of crested flakes, discovered at Maheshvar would result from the removal of such an edge to begin the third series of flakes from a new platform. This presupposes the existence of very large nodules to stand the removal of three series of blade flakes from the core. But the evidence at Maheshvar is against such an assumption, since the size of the natural nodules of agate and chalcedony from the Trap rocks is very small. But the stages I and II described above can directly give rise to a simple crested ridge.

Function of the ridge

On the other hand, this ridge seems to serve a definite function. Its primary function may be stated to be to control the length of the flakes, specially, when one needs very long flakes, and that too in areas, where larger size nodules are available. The classic site, where the flakes and the cores assume giant sizes is Le Grand Pressigny in the Department of Indre-et-Loire in France. Here the preparation of huge cores from the nice honey-coloured flint and their symmetrical shapes have earned for them the name "pounds of butter" (*livres de beure*). Sir John EVANS gives a fine description of the technique. (Fig. 3. No. 2).

> ". . . . it will be seen that the chipping into such a form is in fact, one of the necessities for the case of production of long blades of flint. . . . But where a flake 10 to 12 inches in length is required, a different process becomes necessary. For it is nearly impossible with a rough mass of flint, to produce by single blows, plane surfaces 10 to 12 inches in length, and arranged at such an angle as to produce a straight ridge, such as to form a backbone, as it were, of a long flake; and without such a backbone, the production of such a long flake is impossible. It is indeed this ridge that regulates the course of the fissure by which the flake is dislodged from the matrix or parent flint; there being a slight degree of elasticity in the stone, which enables a fissure, once properly commenced in a homogenous flint to proceed at right angles to the line of least resistance in the dislodged flake, while at the same time exerting a nearly uniform strain, so that the inner surface of the flake becomes nearly parallel to the outer ridge."[7]

7. EVANS, Sir JOHN, *The Ancient Stone Implements, Weapons and Ornaments of Great Britain*, II Ed. London, 1897, pp. 27-28.

Similarly, the technique of the industry at Melos in the Aegean, is described by BOSANQUET,[8] while explaining the flakes with crested ridges :

> "It comes from a block which was roughed out by striking a succession of flakes from two adjoining sides, the pressure which dislodged them from one side having been applied midway befrom the other; in this way the angle acquired the form of a zigzag ridge; in the next stage, the flakes were removed from the longer axis of the core and at right angles to those removed in the trimming process (which has been struck off along the longer axis) and one of the first to be removed will be longer flake."

In simple words, we may say that the removal of two series of flakes from the either side of a pre-determined line along the length of the core, creates a series of weaknesses parallel to this ridge. Hence the length of the flake depends on the extent of cross flaking along the core. BRICE and DONMETZ[9] have suggested that these crested ridges "guide the run of the first blade removed" and have suggested the use of the term "crested guiding ridges" for such flakes, recalling the French term "detaching flake". Frank WILLETT[10] has also described some specimens from Greece with the same features (Pl. III). At Maheshvar, the average length of the cores is about 1.5 to 2 inches, but at Sukkur on the Indus in Pakistan, we have cores going upto 6 to 8 inches (See Pl. I) and we have actual crested flakes varying in length from 2 to 5 inches in the British Museum.[11] Hence the adoption of this technique at Maheshvar may be attributed either to the strong industrial tradition which managed to spread, or may be explained as a device to make the longest possible blades out of the bad, small nodules available locally.

A second function has been suggested for this ridge by BRICE and DONMETZ.

> "Our experiments at flaking have taught us that one of the chief difficulties of this technique is to hold the core firm, specially as it becomes smaller. So we would suggest that this keel was

8. BOSANQUET, R. C. *Excavations at Phylakoppi at Melos*, British School at Athens, Supplementary Paper No. 4, London, 1904, p. 219.
9. BRICE and DONMETZ, "A flint blade workshop near Gazientep, South Turkey", *Man*, June, 1951, No. 125.
10. WILLET, FRANK, "Some blade implements from Greece", *Man*, 1953, No. 49.
11. SMITH, REGINALD, A. *The Sturge Collection—An illustrated selection of foreign stone implements bequeathed in* 1919 *by William Allan Sturge*, British Museum, London, 1937.

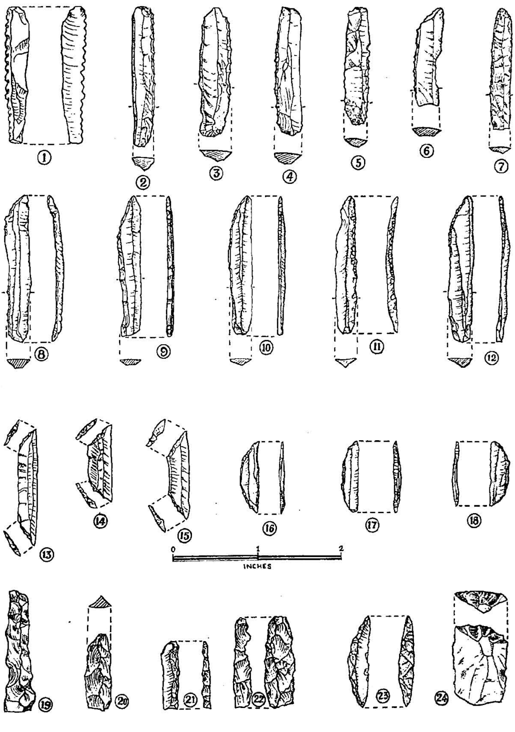


Fig. 7. Finished tools and crested flakes, Maheshvar.

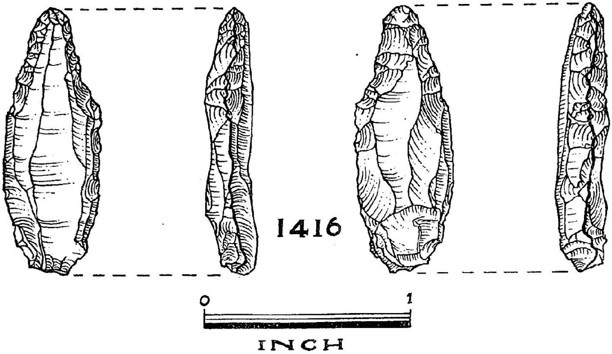


Fig. 8. A borer or an arrowhead on an exhausted core.

prepared to wedge into a slot or groove in the anvil to keep the core steady.[13]

Probably, this may account for the survival of crests on a few cores but it depends more on the position of the crest on the core.

The last two stages may be described as the actual removal of the blade flakes and the secondary retouch. As will be shown further, the number of completely retouched blades is small. But, since long parallel flakes have been deliberately produced, they can straight away serve their function as cutting tools or any other use to which they may be put.

Typology of the Industry

The above description of this highly specialized blade industry would automatically suggest the dominance of the blade at the expense of the other types. Actually, it is a very common phenomenon that the evolution of a technique of mass production invariably leads to a deterioration of the earlier industry, owing to the standardization of tool types. Secondly the appearance of this technique at the transitional stages between the Neolithic and Bronze age, as will be shown further, is very significant, as the blade alone of the earlier series of stone tools has a greater utility with the emergence of metal tools. It also accentuates the process of abandonment of minute retouch. The tables at the end will finely bear out this phenomenon, for this industry of Central India.

Blades

The most predominant tool of this industry is the blade, varying in length from 1.75 to ½ an inch, made out of long parallel-sided flakes. Though the tables treat the blades together, they can be sub-divided into three types :

(1) Serrated blade.
(2) Blades with the blunted back.
(3) Obliquely blunted points or pen-knife blades.

(1) Probably for the first time in India, very characteristic, serrated blades with distinct dentition, were found at Maheshvar. No. I (Fig. 7) is the most remarkable specimen, but found on the surface. One edge is serrated by taking small deep flakes, which can be clearly seen. A good number of specimens from the excavation show this distinctly, but there are a few pieces, where the dentition is not very clear. (Nos. 2, 3 and 4, Fig. 7).

12. BRICE and DONMETZ, op. cit.

(2) The second type, which is the normal type of blade in other industries, is comparatively rare in this assemblage. Its back is blunted by steep retouch. (Nos. 5, 6 and 7, Fig. 7).
(3) By far, numerically, the largest type may be described as an obliquely blunted point. The simplest and the most common form is achieved by an oblique retouch at one end, giving rise to a tool in the shape of a pen-knife. Its function may be stated to be a point, but most of them show definite evidence of use along the edge. Hence this has been included in the category of blades. (Nos. 8, 9, 10, 11 and 12. Fig. 7).

Lunates

After the blades, the next important tool is the lunate. But their number is very small, in relation to the total, as the table will show. All of them are blunted by steep retouch along the arc. This is generally done from one face only. The specimens vary in length between an inch to half an inch. (Nos. 16, 17, 18 and 23. Fig. 7). Two specimens of the other type of lunate, with its chord blunted were found. There are a few trapezes with retouch on the transverse sides, but they sometimes imperceptably tend towards lunates. Hence, they have not been kept in a separate category. (Nos. 13, 14 and 15. Fig. 7).

Scrapers

This is the rarest type in this assemblage. Only 10 specimens have been found, and all of them belong to the "end" scraper group with the retouched working at right angles to the main axis of the flake. About three of them show evidence of working on the side and hence they may be described "side" and "end" scrapers. (No. 24 Fig. 7).

Core tools

The most interesting evidence about the use of wasted or exhausted cores occurs at Maheshvar. This is provided by fine pointed tools made from flat cores. (Fig. 5. No. 2 and 4). Both the specimens are made of flat cores. At one end a point is attained by oblique retouch from both the ends. Particularly the specimen (No. 1416. Fig. 8) is very interesting as the oblique edge itself is very sharp and the retouching is done from both the sides. Is it an untanged arrowhead or a borer? The third specimen is somewhat roundish and retains its crested ridge (Pl. 5, No. 6). At one end, a point is achieved by retouch, to make probably, a borer.

The other type of tool is somewhat doubtful, but the specimen cannot be explained in any other way except by taking it as a tool. The specimen No. 1 (Fig. 5) shows regular fluting on one side. The platform end of the core, (taking the negative bulbs of percussion as the

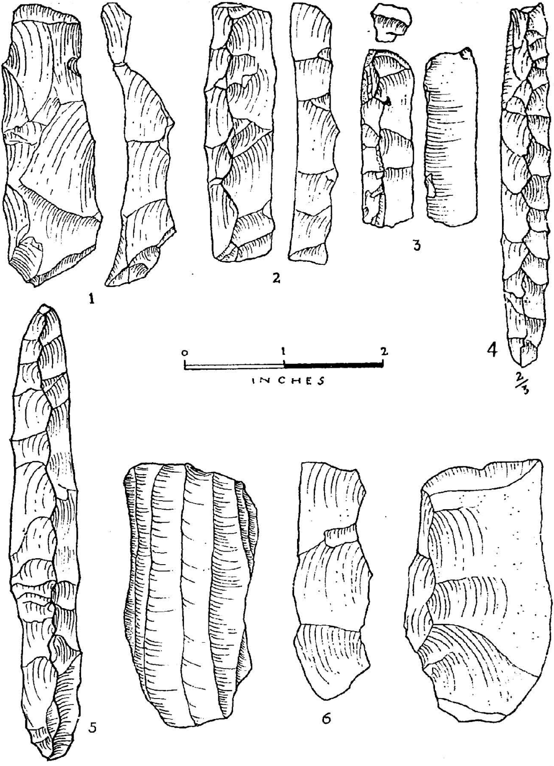


Fig. 9. Crested flakes or Lames de degagement from Western Asia and a core. Jericho , Palestine (1 and 2); Duluk, S. E. Turkey (3); Sakcegozu, S. E. Turkey (4) Jerash, Jordan Valley (5) and core from Makertu, Iraq (6)

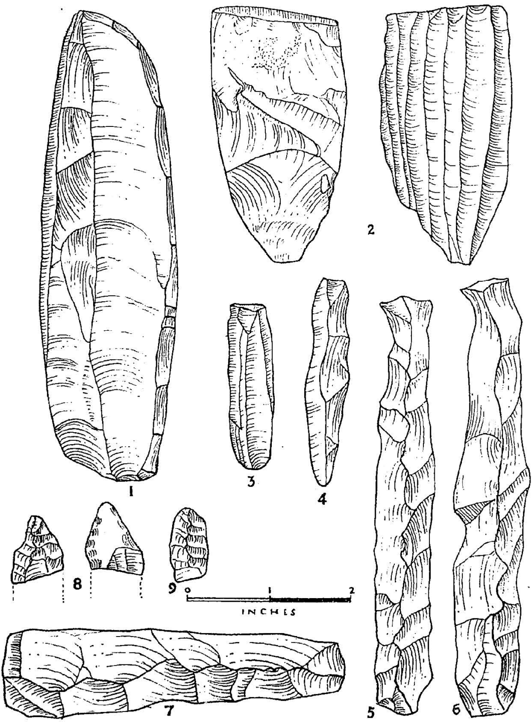


Fig. 10. Cores and crested flakes from Pakistan and Cutch. Sukkur-Rohri on the Indus (1-7) and Lodag Cutch (8-9).

criterion for fixing it), is less than one-eighth of an inch in the centre. but has a sharp straight edge. Such a narrow platform would not have enabled the makers to take such long flakes as the front face of the core shows. From the back, one notices a deliberate flattening by removing a series of shallow flakes and the sharp edge shows a *'Tranchet type'* flaking. Hence it seems to have been deliberately made to get a sharp scraping edge. No. 8, (Pl. 5) shows a similar edge more or less with a very fine retouch at the scraping end. Similarly on No. 9 (Pl. 5), the bulblar end (or the platform end) is sharpened.

Thus an analysis of the tool types brings about the dominance of the blade in this industry. If we take the definitely retouched specimens into consideration we get the following interesting data trench wise:

Trench I — 73.9% of the total tools NVT.
Trench III — 70.6% of the total tools NVT.
Trench V — 70.6% of the total tools MHSR

An abstract of the tools is given below from all the trenches.

Trench	Blades	Lunates	Trapezes	Scrapers
NVT I	147	45	4	3
NVT II	4	3	5	—
NVT III	8	3	—	—
NVT IV	9	4	3	3
NVT V	24	5	2	1
MHSR V	12	3	—	2
Total :	204	63	14	9
Percentages of the total tools	70.34	21.72	4.83	3.10
Percentage of the total including waste products and cores	2.70	0.86	0.19	0.01

Before we proceed to discuss the affinities of this technique, the chief features of the Maheshvar industry may be summarised as follows :—

1. The basic raw material consists of nodules of agate and chalcedony from the Trap formation, and found abundantly in the bed of the river,

2. As the chief objective of the tool maker was to turn out as many blades as possible, a specialized technique was employed.
3. The following stages of production may be recognized :
   (a) Dressing the noduls.
   (b) Preparation of the guiding ridge.
   (c) Removal of blades.
   (d) Secondary retouch for finishing the process.

II

A note on the history and distribution of the technique.

It is indeed strange that the identification of this technique at Le Grand Pressigny was not followed up by careful analysis from other sites in Western Asia and Europe. No systematic effort was made though BOSANQUET,[12] CHEYNIER and BARNES[13] described this technique, until DONMETZ and BRICE[14] carried out the experiments and explained the technique. The writer's study of this technique started with the small note of Frank WILLETT,[15] describing some specimens from the Finlay collection in the Manchester Museum. Hence a thorough study of the Maheshvar collection was made, before his visit to England in 1954. The following note is based on a study of the materials and literature available mostly in the London University Institute of Archaeology and the British Museum. Hence, with this limitation, it is proposed to discuss the history of this technique. But the greatest handicap is the relative neglect of flint and obsidian implements in the hands of most of the archaeologists working in Western Asia. Hence this problem requires a much greater attention. The following account is mainly intended to focus the attention of the scholars and seek further information. At the same time a provisional hypothesis on the origin of the technique is put forward on the basis of data presented herewith.

As already pointed out, this technique is essentially intended to mass produce blades and it invariably results in a deterioration in variety and quality of flint and other stone tools. But the greatest difficulty, confronted in the course of these comparative studies, was to find a sure means of identifying this technique. The problem is very much complicated by the existence of, what one may call "factory sites" near the sources of raw materials, and the export of flakes or blades to other sites. For example, it is well known that the great flint factories of Le Grand Pressigny were exporting blades to different parts of Western Europe.

13. BOSANQUET, op. cit.
14. CHEYNIER and BARNES, op. cit.
15. WILLETT, op. cit.

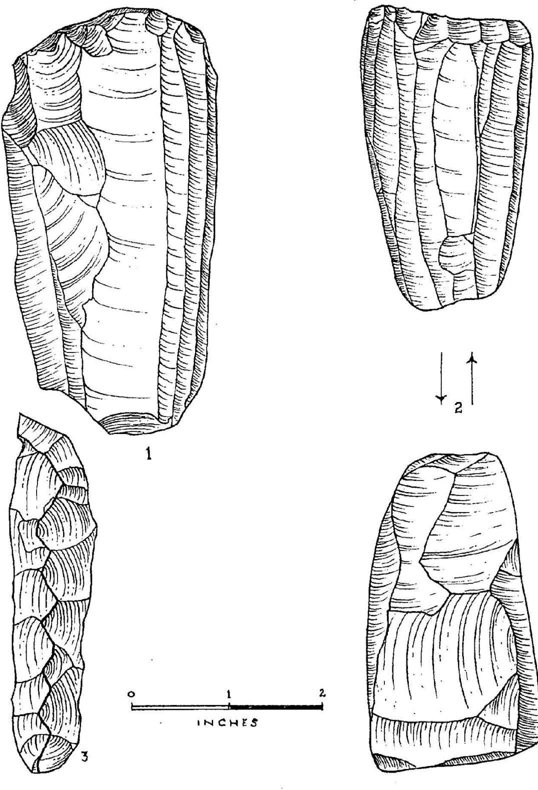


Fig. 11 Cores and flake from Pakistan, Kot Diji (1 and 2) and Hisbani (3). By Courtesy Prince of Wales Museum of Western India, Bombay.

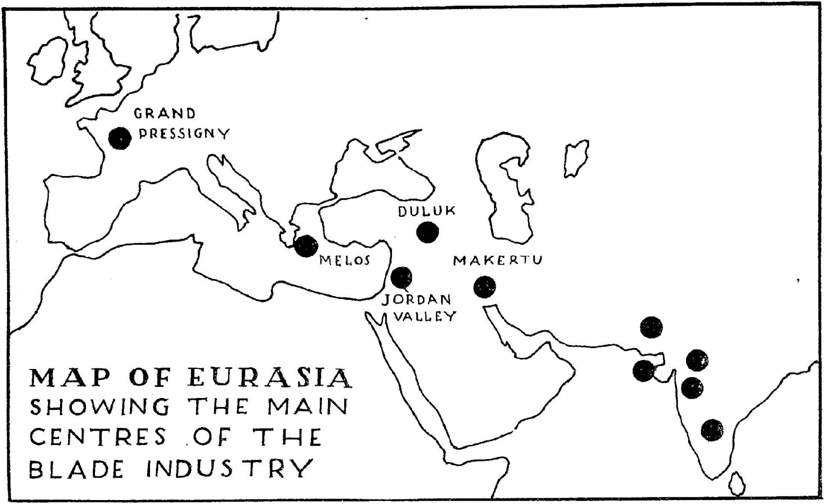

GRAND
PRESSIGNY
MELOS
DULUK
MAKERTU
JORDAN
VALLEY
MAP OF EURASIA
SHOWING THE MAIN
CENTRES OF THE
BLADE INDUSTRY

Fig. 12.

"The most prolific of all European flint factories, those of Grand Pressigny .... were devoted mainly to the production of long blades and various types of artifacts made from these .... but the first signs of large scale industry supplying more or less extensive market did not appear until much later and in fact, the activity did not reach its zenith untill the end of the Neolithic times. .... It is particularly significant, that the great flint and stone axe manufactories languished, but the Grand Pressigny workshops, concentrating on such forms as daggers and knives, continued to flourish well into the Bronze Age.[16] There are nearly 60 sites in the valley of Indre just around Grand Pressigny.

Similarly in the Aegean, we have an identical situation. The small island of Melos seems to be the chief source of obsidian for the whole Aegean region. Here again, we see the remarkable phenomenon of obsidian from Melos being exported to different islands and Greece. Bosanquet describes a factory belonging to the Pre-Mycenian period, lying below the wall of Early Mycenian period at Phylakoppi.[17] "Melos, being the principal, if not the only source from which this useful substance (obsidian) could be obtained by the people of Aegean, seems from very early days to have commercial relations not only with the neighbouring islands and the Greek mainland but also with the coast of Asia Minor and even with Egypt."

Another such prolific factory area, where we have definite evidence of cores as well as flakes, is near Gazientep in south Turkey (Duluk near Dolische, 12 miles NNW of Gazientep) described by DONMETZ and BRICE.[18] Finally the most extensive factory site of stone implements known in the Indus Valley, is the site of Sukkar and Rohri in Pakistan. Here the river flows through a gorge of limestone with extensive outcrops of fine chert. This site on either bank of the Indus has never been studied properly though vast collections have been made for more than half a century. Of all the varieties of stone tools, the most famous finds of this site are the fine fluted cores. A few crested flakes were illustrated by PATERSON and DE TERRA.[19] As very few cores have been reported from the chief cities of Mohenjodaro and other cities of the Indus Valley, it is not unreasonable to infer that blades were being exported from here.

A few petrological or spectrographic analyses of materials from different sites will finally solve this problem. Such an assumption can be easily verified from the site of Sakce Gozu. At the town site excava-

16. CLARK, GRAHAME, *Prehistoric Europe*, London, 1952, pp. 182-185.
17. BOSANQUET, *British School in Athens* III, (1896-1897), pp. 216-233.
 " op. cit. p. 218, (1904).
18. DONMETZ and BRICE, op. cit.
19. DE TERRA, H. and PATERSON, T. T., *Studies on the Ice Age in India and Associated Human Cultures*, 1939, pl. L, 1-2.

ted by J. du Plat TAYLOR, M. V. Seton WILLIAMS and John WAECHTER[20] none of the waste materials were reported, but from the cave site, we have our characteristic "Lames de degagement."[21]

So one of the most important features of this technique may be stated to be the beginning of huge factory sites where the waste products of such efforts may be studied. The natural corollary of this *viz.* export of finished blades and blade flakes can be inferred from the notable feature of a number of sites where blades occur in profusion with a disproportionately small number of cores.

Distribution

We have already seen the difficulties of studying and identifying the technique. Hence, wherever we have definite evidence of this elaborate preparation of these cores or any other evidence, it is accepted. But since we have already discussed the origin and function of these crested ridges or *lames de degagement*, their occurrence is also taken as evidence of it. Hence the following distribution data is based on both these criteria. The other difficulty is of chronology. It is difficult to date some of these factory sites. But a few well dated sites like Jericho and other sites in the "Fertile crescent" can help us to trace the beginnings of this technique.

Western Europe

The classic area is Grand Pressigny, already described. Accord-to CLARK, Grand Pressigny flint seems first to have entered Switzerland in any quantity with the 'corded ware'. In Jersy it was common at the Pinnacle site and it occurred in a Bronze Age Barrow III at Emmen in Gelderland.[22] According to EVANS, it was noticed at Spiennes near Mons in Belgium and Denmark.[23] The writer noticed a large core of the Grand Pressigny type from Robenhaus in Switzerland at the Museum at Les Eyzes, France.

Aegean Region

We have already seen the importance of Melos. From the Finlay collection lying in the Manchester Museum, WILLETT has reported from the following sites in Greece :[24] Cerigo, Braonais, Corinth and Chilio-

20. DU PLAT, TAYLOR, J., SETON, WILLIAMS, M. V., WAECHTER, J., Excavations at Sake Gozu, *Iraq*, XII, 2, 1950, pp. 53-138.
21. WAECHTER, J. GOGUS, SABHAT, and SETON WILLIAMS, VERONICA, "Sake Gozu—Cave site—1949", *Bulletin Türk Tarin Kurumu*, cilt XV, Ankara 1951, pp. 193-201.
22. CLARK, *op. cit.*, p. 251-252.
23. EVANS, *op. cit.*, p. 27.
24. WILLETT *op. cit.*

BY COURTESY · BRITISH MUSEUM

Plate. I. Specimens of cores and waste flakes from Sukkur and Rohri Pakistan.

BY COURTESY - FRANK WILLETT

Pl. III. Cores and crested flakes of Greece and Melos from Finlay collection, Manchester Museum.

modi (Pl. III). It is quite well known that obsidian from Melos occurs, in Crete, according to Pendelbury in the Neolithic, Early Minoan I and III.[25]

According to STEPHANOS XANTHOUDIDES, the obsidian from Melos occurs in the vaulted tombs of Mesara in Southern Crete,[26] at the following sites: Platanos, Aspre petra, Koumsa (actual crested flake has been found) and Kalathiana.

Turkey

We have already seen the evidence from the site of Duluk near Gazientep and Sakce Gozu. At the later site the cave site yielded well defined specimens described at *lames de degagement* and the habitation belongs to two periods: Middle Chalcolithic-(Ubaid) and pre-Hittite-Early part of the II Millennium (1950-1450 B.C.)[27] Garstang reported a huge outcrop of obsidian near Nevshehr in south-western Turkey, north of Mersin, but his collection of "extremely plentiful" cores and flakes has not been published.

'Fertile Crescent'

Here fortunately, we have definite evidence about the beginnings of this technique from excavations. The best evidence comes from the excavations at Jericho in Palestine by John GARSTANG. A number of crested flakes from this collection lying in the Institute of Archaeology, London University, are illustrated in Pl. II. They come from the Neolithic levels of Jericho.[28] From the Samarran site at Baghouj, Linda BRAIDWOOD has reported—*'lames de degagement'*.[29] From the Jordan Valley, D. Kirkbride has discovered similar crested flakes from Jerash and Uweinid near Azraq. According to Professor F, E. ZEUNER, who kindly permitted me to publish the specimen from Jerash (No. 5 Fig. 9), the industry is not yet studied, but it may probably belong to the Neolithic (?). From the Sturge collection in the British Museum, there are a few cores from a site called Makertu in Iraq, about 70 miles from Baghdad.[30]

25. PENDELBURY, J. *Archaeology of Crete*, pp. 39, 52, and 90.
26. XANTHOUDIDES, STEPHANOS, *The Voluted tombs of Mesara—An account of some early cemeteries of Southern Crete.* Trans. by J. P. DROOP, Liverpool, 1924, p. 21, (pl. XXII. No. 866) and p. 84.
27. WAECHTER, GOGUS and SETON WILLIAMS, op. cit.
28. GARSTANG, JOHN, *"Jericho city and Necropolis"*—"Fifth Report", *Liverpool Annals of Archaeology and Anthropology*, XXII, 1935. See Notes on Flint implements by Joan CROWFOOT, (Section IX) pp. 174-184.
29. BRAIDWOOD, R. J., BRAIDWOOD, Linda., TOULENE, EDNA and PERKINS, ANN. L. "New Chalcolithic material of Samarran type and its implications", *Journal of the Near Eastern Studies*, III, 1, 1944, p. 55.
30. SMITH, op. cit.

Pakistan

We have already referred to the factory sites of Sukkur and Rohri. At a number of sites, large quantities of chert blades, with very little retouch have been found. On the analogy of the other factory sites, we may suggest that finished products might have been exported. Chanhudaro yielded a few flakes with crests.[31] Probably a fresh examination of some of these materials from the Indus Valley sites is a great desideratum. In the collection of late K.R.U. Tod from Karachi, there is one crested flake. In the Prince of Wales Museum, Bombay, specimens collected by GHURYE from Hisbani and Kot Diji show the same technique (Fig. 11).[30a]

India

After the identification of this technique, thorough enquiries were made and this brought to light the wide distribution of this technique. The size, from the recent collections varies from five inches to about an inch. But the most interesting find came from Mirzapur. Unfortunately, all traces of this material were lost in Britain, where they were taken. Hence I can do no better than quote COCKBURN:

"Chert is derived from the Lower Vindhyan lime stone rocks in the vicinity. Indeed, the Lower Vindhyan strata crop up in ravines themselves and at the southern margin of the ravines, abut against the red gneiss of south Mirzapur. From the large size of implements exhibited, there can be no doubt, whatever that this was an exceptionally favourable locality for procuring chert in large blocks, probably the finest on the borders of the Sone. There is only one other locality in India where flakes of similar dimensions have been found, and that is near Rohri in Sind;"

"A comparison of these specimens......with flakes from the rock shelters of south Mirzapur (Sarhow cave) will at once show their comparatively gigantic size. These Kon flakes are about the same size as the finest English and Irish specimens. It must be understood that these flakes, though half the size of the fine specimens from Pressigny, in France, as in example at p. 28 of EVANS *Ancient Stone Implements* of Great Britain, Fig. 6, have the merit of having their bevels made at a single blow. The very large French and English examples have all their ridges trimmed by blows administered at right angles to their length, so as to form a ridge. Nos. 8 and 10 come under EVANS' definition of flat flakes, having had a flake struck off the ridge. No. 3 is a ridged flake and was probably intended to be made into a spearhead. No. 20 is a typical flint knife. Examples of large coarse flakes 10 to 12 inches long and rivalling the largest European specimens will be seen in Figs. 15, 16, 17[32] and 18."

who will dispute the bonafides of COCKBURN after looking at his elaborate comparisons? It is only tragic that his paper is marred by bad illustrations; specially is it more so, when all traces of this material have been lost and his notes are scanty. A fresh exploration is the obvious solution.

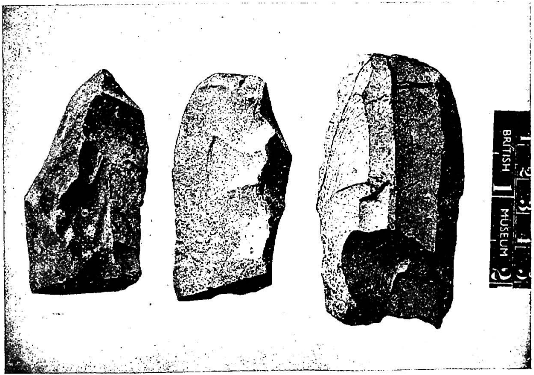
30a. A Similar industry is found in the Lop Desert, Central Asia. See STEIN, Aurel *Innermost Asia*, Vol. III, pl. xxii (H.D.S.).

31. MACKAY, E. J., *Chanhudaro Excavation*, 1935-36, p.

32. COCKBURN, J. "On flint implements from the Kon ravines south of Mirzapur", *Journal of the Asiatic Society of Bengal, Proceedings*, 1894, 3, Pp. 21-27.

By Courtesy - Institute of Archaeology, London University.

Pl. IIa. Crested flakes from Jericho -Palestine.
From the Neolithic levels from Garstang's excavation.



By Courtesy - British Museum

Pl. IIb. Cores from Makertu (70 miles north-east of Baghdad), Iraq

Similarly in the Kaladgi limestone series of Bijapur and Western Raichur, we have very good sources of chert. Again Raichur district yields long blades and cores and we have definite evidence of this technique at Maski. From the older collections in the Hyderabad Museum, the following specimens provide an interesting comparison:—

M. 3247-52 F. : A core with a crest on the side and shows the evidence of dressing.

M. 3245-52 F. : Dressed core partly worked.

M. 3248-52 F. : Dressed core partly worked.

In the Annual Report of 1935-36, we have a crested flake.[34] Shri B. K. THAPAR reports that he has large number of crested flakes and cores showing the preparation from his recent excavations at Maski.[35]

Now reverting to areas where the raw material is defective and not of the requisite size, we find a remarkable adaptation by these Chalcolithic people. They used it on the small nodules and yet retained all the features of the technique, as the Maheshvar Blade industry amply demonstrates. This technique has been definitely identified in the Valley of the Chambal at Nagda, where we get characteristic cores and flakes. Shri Wakankar has explored a number of sites of the Proto-historic curture in the Malwa plateau. On the eastern fringes of Malwa, at the foot of the Aravallis, the Rajasthan Department of Archaeology has conducted excavations at Ahar, near Udaipur.[36] This area belongs to the Banas system, which is a tributary of Chambal, which in turn joins the river Jamuna. Here again, the Maheshvar type sequence was repeated with the same materials.

The extensive explorations of Shri M. N. Deshpande followed by his excavation at Bahal on the Girna in East Khandesh,[37] the excavations of Shri B. K. THAPAR at Prakasha[38] in West Khandesh, and excavations of Dr. SANKALIA at Nasik, Jorwe[39] and Nevasa leave no doubt at the wide distribution of this technique in the valleys of the Tapi and the Godavari.

Going further south into the Krishna Basin, we have already referred to Maski, where it occurs in an identical cultural context. At

33. I am very much obliged to the Director of Archaeology, Hyderabad for permitting me to examine it.
34. *Annual Report of the Department of Archaeology*, Hyderabad State, 1935-36, Pl. III (d).
35. I am very much obliged to Shri B. K. THAPAR for the information.
36. I am very much grateful to Shri R. C. AGARWALA for this information.
37. I am very much obliged to Shri M. N. DESPHANDE for the information.
38. India News and personal communication from Shri B. K. THAPAR, for which I am very much obliged.
39. SANKALIA, H.D. & DEO, S.B. *The Excavations at Nasik and Jorwe*, 1950-51, Poona, 1955. Deccan College Monograph Series, 13. Fig. 58 and Frontispiece.

Brahmagiri in Northern Mysore, a crested flake has been illustrated[40] and it may be noted that very few cores have been found. At Sanganakal near Bellary a few cores have been found,[41] but fresh exploration is needed, since the existence of this technique was not known at that time. But here again, they all go with the Chalcolithic culture.

Explorations by Shri P. P. PANDYA in the Halar and Sorath Districts[42] and the excavations of Shri S. Ranganatharao at Rangpur and Motamachiala also reveal the same feature about the age and character of this Blade industry.[43]

Conclusion:

We have seen the wide distribution in space and time of this particular technique of production of blades on a large scale. The size of the blade is more or less determined by the range and character of the raw material. The most important features may be stated as follows:—

1. Somewhere in the Neolithic period in the 'Fertile Crescent', this new technique of mass production of blades started among the 'incipient agricultural communities' of BRAIDWOOD, and it continued to flourish right into the Bronze Age. It seems to have spread in either direction towards Europe and India.
2. The utility of stone implements begins to decline with the gradual appearance of metals. Of all the earlier forms, the blade remains the most useful tool.
3. Emergence of this technique led to the appearance of huge factory sites near the sources of raw materials.
4. The decline in the production of the types of stone tools and the emergence of the technique can be recgnized by the dominance of the blades in the local stone industries.

This general decline is very pertinently pointed out by R. J. BRAIDWOOD. "Matarrah produced no identifiable projectile points and, in fact, no flint or obsidian objects which had any secondary retouch such as exhibited on Hasuna examples....... the impression one receives.... is of a flint industry which has few identifiable types, only sickle blades and projectile points and perhaps an end scraper can be identified in the illustrations but which is primarily *a neat blade industry*.[44] The statistical data from Maheshvar speaks for itself.

40. WHEELER, R.E.M. "Brahmagiri and Chandravalli", *Ancient India*, No. 4, Pl. cxiv.
41. SUBBARAO, B. *Stone Age Cultures of Bellary*, Deccan College Dissertation Series, 7. Poona, 1948. Pl. xxiv.
42. PANDYA, P.P., "*Archaelogical Exploration in Halar*", *Journal of the M.S. University*, Vol. IV. No. 1 1954.
43. I am very much obliged to Shri S. R. RAO for this information.
44. BRAIDWOOD, R.J., and others, *op. cit*, p. 68.

TABLE—1

NAVADATOLI—MOUND I, TRENCH 1

ABSTRACT OF MICROLITHS

Layer	Core	Asymmetrical flakes	Crested and Worked flakes	Parallel sided flakes (*Symmetrical*)	Blades	Lunate	Trapezes	Scrapers	Total
1	4	11	—	19	3	—	—	—	37
2	5	25	9	144	20	2	—	—	205
3	13	135	23	542	52	12	—	—	778
4	13	256	13	646	22	2	1	—	953
5	14	460	18	451	18	1	2	—	964
6	32	706	5	244	9	—	1	—	997
7	10	1154	5	140	19	25	—	8	1356
8	—	104	—	10	4	1	—	—	119
9	—	—	—	1	—	1	—	—	2
TOTAL	91	2851	73	2197	147	45	4	8	5411
Percentage	1.7	52.7	1.3	40.6		3.7			

Percentage of *blades* to the total of finished tools 73.9
Percentages of *Lunates* to the total of finished tools....22.7
Percentage of *Trapezes* to the total of finished tools...... 2.0
Percentage of *Scrapers* to the total of finished tools...... 1.5

TABLE—2

NAVADA TOLI—MOUND I TRENCH—2

ABSTRACT OF MICROLITHS

Layer	Core	Asymmetrical flakes	Crested and worked flakes	Parallel sided flakes (Symmetrical)	Blades	Lunate	Trapeze	Scraper	TOTAL
1	1	55	—	17	—	—	1	—	74
2	12	647	5	45	—	—	1	—	770
3	4 One turned into border	395	7	44	3	3	3	—	460
4	—	22	1	7	1	—	—	—	31
TOTAL	18	1119	13	113	4	3	5	—	1335
Percentage	1.3	83.8	0.9	8.4			0.85		

Percentage of *Blades* to the total number of finished tools 33.3
Percentage of *Lunates* to the total number of finished tools 25.0
Percentage of *Trapezes* to the total number of finished tools 41.7

TABLE—3

NAVADA TOLI—MOUND II TRENCH—3

ABSTRACT OF MICROLITHS

Layer	Core	Asymmetrical flakes	Crested and worked flakes	Parallel sided flakes (Symmetrical)	Blades	Lunate	Trapeze	Scraper	TOTAL
1	1	—	1	2	1	1	—	—	6
2	—	—	—	3	—	—	—	—	3
6	—	—	—	1	—	—	—	—	1
9	—	—	—	—	1	—	—	—	1
10	—	—	1	3	—	—	—	—	4
11	—	—	—	1	—	1	—	—	2
12	—	2	1	15	2	1	—	—	21
13	1	3	1	10	2	—	—	—	17
14	—	3	3	5	2	—	—	—	13
15	—	—	—	6	—	—	—	—	6
TOTAL	2	8	7	46	8	3	—	—	74
Percentage	2.7	10.8	9.5	62.2	14.9				

Percentage of *Blades* to the total of finished tools 72.7

Percentage of *Lunates* to the total of finished tools 27.3

TABLE—4

NAVADA TOLI—MOUND II TRENCH—5

ABSTRACT OF MICROLITHS

Layer	Core	Asymmetrical flakes	Crested and worked flakes	Parallel sided flakes (Symmetrical)	Blades	Lunate	Trapeze	Scraper	TOTAL
2	1	1	4	12	2	—	—	—	20
3	1	5	—	9	4	1	—	1	21
4	3	2	1	15	4	1	—	—	26
5	2	7	3	21	3	1	1	—	38
6	—	14	6	40	7	1	1	—	69
7	5	14	—	19	4	1	—	—	43
8	—	1	—	—	—	—	—	—	1
TOTAL	12	44	14	16	24	5	2	1	218
Percentage	5.5	20.18	6.42	53.21		14.68			

Percentage of *Blades* to the total of finished tools 75.00
Percentage of *Lunates* to the total of finished tools 15.63
Percentage of *Trapezes* to the total of finished tools 6.25
Percentage of *Scrapers* to the totol of finished tools 3.13

TABLE—5

MAHESHVAR V

ABSTRACT OF MICROLITHS

Layer	Core	Asymmetrical flakes	Crested and worked flakes	Parallel sided flakes (Symmetrical)	Blades	Lunate	Trapeze	Scraper	TOTAL
3	—	1	—	—	—	—	—	—	1
4	—	—	—	—	—	—	—	—	—
5	—	1	—	2	1	—	—	—	4
6	—	—	—	—	1	—	—	—	1
7	2	1	—	—	—	—	—	—	3
8	—	—	—	1	—	—	—	1	2
9	—	—	—	—	—	—	—	—	—
10	1	5	1	10	1	—	—	—	18
11	2	11	1	11	3	—	—	—	28
12	3	47	4	21	6	3	—	1	85
TOTAL	8	66	6	45	12	3	—	2	142
Percentage	5.7	46.5	4.2	31.7			11.9		

Percentage of *Blades* on total of finished tools 70.6
Percentage of *Lunates* on total of finished tools 17.6
Percentage of *Scrapers* on total of finished tools 11.8

TABLE—6

NAVDATOLI—MOUND III, Trench IV.

Abstract of Microliths

Sub-Square		
A-B	1	Blade.
	12	Symmetrical flakes.
	2	Crested flakes.
	3	Asymmetrical flakes.
D	1	Blade.
	1	Side and End Scraper.
	1	Lunate.
	5	Symmetrical flakes.
G	1	Trapeze.
	2	Symmetrical flakes.
H	1	Blade.
	1	End scraper.
	1	Lunate.
	12	Asymmetrical flakes.
	2	Symmetrical flakes.
I	1	End scraper.
	2	Blades.
	1	Core.
	6	Asymmetrical flakes.
	11	Symmetrical flakes.
J	2	Symmetrical flakes.
	1	Asymmetrical flakes.
	1	Core.
K	1	Lunate.
	1	Blade.
	2	Cores.
	13	Symmetrical flakes.
	4	Asymmetrical flakes.
L	1	Lunate.
	1	Trapeze.
	5	Blades.
	2	Asymmetrical flakes.
	14	Symmetrical flakes.

M	1	Blade.
	2	Cores.
	28	Symmetrical flakes.
	4	Asymmetrical flakes.
N	2	Cores.
	1	Blade.
	8	Symmetrical flakes.
O	2	Symmetrical flakes.
T	2	Trapezes.
	1	Symmetrical flake.

A NOTE ON THE BLADE INDUSTRY FROM EXCAVATIONS AT NEVASA (1954-55).

By

H. D. SANKALIA.

The conclusions reached by Dr. Subba RAO, regarding the character of the Blade Industry of Maheshvar are amply borne out by our recent excavations at Nevasa. A careful stratigraphical record was maintained; even the distribution per subsquare, and three dimensional measurements were taken wherever the exact location of the microliths could be noted. The latter will be published in the main report on Nevasa. Here the stratigraphical distribution and the numbers of each *main* type have been given. More details about the various types in cores, scrapers, and in the saw, saw-like or used parallel-sided flakes will be given in the final report.

A total of 1901 specimens was found from a trench 45′×45′. This was divided into four sub-squares 20′×20′, and dug out completely upto a depth of nearly 30 ft. The Chalcolithic layers—Nos. 7-13—were sealed by the white hemp and lime flooring. Still some microliths have managed to get in layer 6, and then occur sporadically in the upper layers. These occurrences in layer 6 may be due to the overlap of the two cultures, or more probably due to the turning up of the old habitation debris by the iron-using people in about 300 B.C. Anyway out of a total of 1901 specimens, more than 60 percent are parallel-side flakes. This definitely proves the preponderance of the blade or a flake which could be used as a blade. Hence it was that the industry was called "The Microlithic Blade Industry of Jorwe", after the first type site at Jorwe.[1]

1. In SANKALIA, H.D., and DEO, S.B., "*Report on the Excavations at Nasik and Jorwe*", (Poona, 1955), p. 151.

STRATIGRAPHICAL DISTRIBUTION OF MICROLITHS AT NEVASA
(AREA DUG. 40 feet × 40 feet × 30 feet).

Layer	CORES Crude (a)	CORES Fluted (b)	Primary Flakes	Parallel sided flakes	Obliquely blunted or PEN-KNIFE BLADES	LUNATES	TRIANGLE	TRAPEZ	SAW, SAW-LIKE & used parallel sided flakes	Scraper	Flakes with crested ridge	Any other new variety	Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	13
(1)	6	6	2	—	—	—	—	—	—	6	—	—	—
(1a)	1	3	6	—	—	—	—	—	—	1	—	—	—
(2)	12	1	5	6	1	2	—	—	10	10	1	—	—
(3)	1	—	—	—	—	—	—	—	1	5	—	—	—
(4)	—	—	—	—	—	—	1	—	—	—	—	—	—
(5)	1	—	—	8	—	—	1	1	1	3	—	—	—
(6)	31	4	50	35	5	—	—	—	18	2	1	—	—
(7)	15	13	51	62	10	8	—	—	64	10	7	1 Hammer stone worked	—
(8)	30	5	51	48	4	1	—	—	32	8	44	—	—
(9)	84	16	184	160	4	—	—	1	54	6	12	—	—
(10)	19	14	75	100	5	9	—	—	45	—	12	—	—
(10a)	15	16	63	239	12	8	1	1	25	1	7	—	—
(11)	5	4	40	81	7	1	1	1	18	2	15	—	—
(12)	1	2	17	26	—	—	—	—	5	2	1	—	—
(13)	—	—	1	2	1	—	—	—	1	—	—	—	—
TOTAL	221	84	545	767	49	29	4	4	274	53	60	1	—

Grand Total 1901

REVIEWS

Mahārāṣṭrāṁtīla Rāṣṭravādācā Vikāsa, (*in Marathi*) by Nalini PANDIT, Sadhana Press, Bombay, 1955, pp. 6+256, Rs. 5/-.

Mahārāṣṭrāṁtīla Rāṣṭravādācā Vikāsa has a much wider scope than its title suggests. This book is a penetrating analysis of the relations between various social and political events in Maharashtra and currents of thought which prevailed here due to the movement for freedom of India. Details of these events have been skipped over on the assumption of their knowledge on the part of the reader. The book does not claim to be a detailed history of nationalism in Maharashtra. It aims at studying the content of different schools of thought and tries to discover their inter-relationship.

A clear picture of the development of nationalism presents itself through the sections:

(1) Fresh consciousness of the New Era;
(2) Rise of Nationalism;
(3) Nationalism and Individualism;
(4) Freedom and Democracy;
(5) Indian National Congress and Gandhism;
(6) Communalism and Class-Ideology;
(7) Conclusion.

Nalini PANDIT examines critically thoughts of LOKAHITAVADI, RANADE, GOKHALE, TILAK, AGARKAR, CHIPLUNKAR, SAVARKAR, GANDHI, M. N. ROY and others and their effects on social progress. Starting with 'Paramahamsa Mandal', being the first secret organisation founded in 1840 to destroy caste and communal barriers and to advocate widow marriage, PANDIT considers the working of all the important organisations like the 'Dekhan Association', 'Bombay Association', etc., right up to the 'Radical Democratic Party' founded by M. N. ROY in 1940.

This is an important contribution towards the understanding of Maharashtrian make-up of thought in its proper perspective. Academic interpretation of the facts with cautious expression in weighed language is the chief merit of this work. She is meticulous in evaluating merits and limitations of various thoughts and events. In her treatment of the subject persons do not count, with the result that she is free from any personal bias. Some of her comments are likely to disturb hero-worshippers as it is quite possible for them to differ from PANDIT in the matter of interpretation.

We congratulate Nalini PANDIT on her dispassionate approach to our history of the last century with a clear vision and critical realisation.

M. G. PANSE.

The Age of Imperial Kanauj, Bharatiya Vidya Bhavan's History and Culture of the Indian People, Vol. IV, pp. 1-539 including General Bibliographies, Index and Maps (Bharatiya Vidya Bhavan, Bombay, 1955). Edited by Dr. R. C. MAJUMDAR and Dr. A. D. PUSALKAR.

Of all the volumes published so far by the Bharatiya Vidya Bhavan in this series, the present volume is most welcome. For, so far, there was no general work dealing with the period of about 250 years, from C. 750—1,000 A.D., though there were monographs on the Pālas, Gurjara-Pratihāras, and the Rāshṭrakūṭas, the three chief actors on the political stage of the proto-Rajput and pre-Islamic India. Multi-sided approach by the various contributors on the history of different parts of India and Greater India, Language and Literature, Political Theory, Administrative Organisation, Law and Legal Institutions, Religion and Philosophy, Social conditions, Economic Life, Colonial and Cultural Expansion shows that several aspects of India's political and cultural life began to get crystalized during the fateful two centuries and a half. They, however, took their final shape in the next period. And this for the sake of emphasizing the part played by Kanauj, and its rulers the Gurjara Pratiharas, may be separated, and treated in one volume as done now, but the whole period C. 750 A.D.—1300 A.D. is indeed one, and would have presented much more integrated picture had this entire period of nearly 600 years been treated in one volume. This is no where more clear than in the sections on iconography, and by the omission of the section on art and architecture. While illustrating the sections on various religions, Dr. J. N. BANERJEE has necessarily to anticipate what is to follow, and worse still leave his rare or unique images unillustrated. Likewise, in the sections of political history, the account of the growth of the Chaulukyas of Aṇhilalapāṭaka, and the Paramāras of Malwa, has to be left incomplete.

The ruler of Sanjan and the neighbouring area was named Jādi Rāṇā, according to the 16th century Parsi tradition. Dr. TARAPOREWALA who has contributed this section suggests that they (the Parsis) added the epithet 'Rāṇā'. This is most unlikely. For the word 'Rāṇaka' (from

which is derived the word Rāṇā) meaning 'a petty ruler, had come into use by the 8th-9th century, and even if the Parsi tradition is as old as the 9th to 10th century, it would have borrowed the word current then. While, by the 16th century, the word "Rāṇā" was in common use for several Rajput rulers.

However, these are minor points in an otherwise excellent publication. A cheaper edition, for the use of students in colleges, is desirable.

H. D. SANKALIA.

Braja-bhāṣā (in Hindī), by Dhirendra VARMA. Hindustani Akadami, Allahabad (U. P.), 1954, pp. 162. Price Rs. 6-0-0.

The book under review is the Hindi translation of the author's original thesis in French *La Langue Braj* (*Dialecte de Mathurā*) for which he was awarded the D. Litt. by the Paris University in 1935. Since Jules BLOCH published his memorable work on the Marathi language, there has been a welcome tendency among Indian scholars themselves to attempt a scientific description of Indian languages. Prof. VARMA thus followed the footsteps of such eminent linguists in the field of New Indo-Aryan Linguistics as Siddheshvar VARMA, S. K. CHATTERJI, and Baburam SAKSENA in writing a valuable treatise on a modern Indian language. The author was fortunate to receive guidance from Prof. BLOCH in successfully achieving the task which he set before himself.

The study of the Braj language presented in the work is based on the material drawn from the 16th, 17th, and 18th century Braj literature (which is mentioned on pp. 9-11), and the one which the author himself collected during the years 1928-30 from Braj as a spoken language in various villages. Before proceeding to give a detailed account of his investigations, the author begins with a short treatment of certain general topics, such as the geographical area where Braj is spoken, the people who speak it, the Braj literature since the earliest times, and the like. This account serves the useful purpose of introducing the reader to the real problems connected with the linguistic study of Braj.

From the linguistic point of view the chapters on phonology, morphology, and syntax are very important. As one goes through these pages one notices how admirably the author has achieved his task of giving an accurate and thorough description of the facts connected with the Braj language. He has also taken care to describe the treatment given in the Braj to the sounds of words borrowed from the Persian and

the English languages. Some of the author's important conclusions are summarised on pp. 127-29. He holds the view that the Braj has not undergone any material change, except in some peculiarities of pronunciation and the use of morphological forms (§ 258), during the last three or four centuries. Today the Braj is being greatly influenced by the Khaḍī bolī. With regard to the other modern Indian languages of North India, the author opines that Kanaujī is not different from Braj (§ 75), that Bundelī can be regarded as a southern form of Braj (§ 261), and that among other languages the Rājasthānī is the nearest to the Braj (§ 259).

The value of the book has been enhanced by the addition of two appendices which did not appear in the original French Thesis published by the author in 1935. One of these gives the specimens of the Braj as spoken at various places in the interior and on the borders of the Braj territory. The second appendix gives a list of all the Braj words occurring in the book.

While discussing the name of the language (pp. 16-17), apparently it is not the intention of the author to give a detailed account of all the references where the word *vraja* occurs. However, the following remarks may be made with regard to the observations made by the author. *Vraja* seems to occur either singly or in composition in the sixth and the twelfth major rock edicts of Aśoka. The actual forms that we get are *vaca* or *vraca* (VI) and *vaca-bhūmikya* (or *bhūmika*) or *vraca-bhumika* (XII). In both cases *vaca* has been equated with Skt. *vraja* by some scholars and the forms have been translated as 'cowpen' and 'inspectors of cowpens' (HULTZSCH, *The Inscriptions of Aśoka*, p. 12, f.n. 6 and p. 22, f.n. 5). In my opinion though this interpretation is possible in the latter case, it is very unlikely in the former, as the hardening of $j > c$ is not witnessed otherwise in the east (but *vaca* occurs in the Dhauli and the Jaugaḍa versions as well). Even the context renders the meaning 'cowpen' improbable in the Rock edict VI. I am, therefore, still inclined to side with BUEHLER and others and take *vaca* in the sixth edict as coming from *varcas*.

Next it may be noted that the Nighaṇṭu (1.10) includes *vraja* in the list of words meaning 'cloud', and the Nirukta while commenting on this passage (2.21) observes that it may also mean 'mountain'. The Nirukta (6.2) derives *vraja* from √*vraj*, and this derivation has been accepted by the author as well (§ 29). BOEHTLINGK-ROTH, (Wörterbuch, s.v.), however, derive it from √*varj*, which is also the view of WALDE-POKORNY (Vol. I. 290). According to BOEHTLINGK-ROTH, *vraja* occurs also as the name of an area in the neighbourhood of Agra and Mathura in a certain inscription which has been published in the ***Zeitschrift für***

die Kunde des Morgenlandes 4.146-202. I have not been able to verify this reference.[1]

—M. A. MEHENDALE.

OFFICE OF THE DIRECTOR OF ...
1078
26 AUG 1969
GOVT. OF MADRAS

1. I am thankful to my friend Dr. W. THOMAS of Göttingen for the following information kindly supplied by him to me about this inscription:—

Der Artikel, in dem sich dieses *vraja* findet, stammt von Chr. Lassen und heisst: "Über eine alte indische Inschrift der königlichen Satrapen von Surâshtra, worin Kandragupta und sein Enkel Acôka erwähnt werden". Er stellt einen Verbesserungsversuch zu Prinsep's Lesung dieser Inschrift dar, die letzterer in As. J. of B. VII 334 veröffentlicht hatte......Die Inschrift ist z.T. auf einer rauhen Oberfläche eingehauen. Sie gehört dem König Rudradāman—der Name ist nicht ganz sicher; Prinsep liest in seiner Ausgabe Aridāman und bemerkt in einer Note, dass man auch an Atridāman oder Rudradāman denken könne—und bezieht sich auf den Bau einer Brücke und anderer Schutzmittel gegen den Fluss Paleśinī. Zeile 11 dieser Inschrift lautet: *janopajanasvavīryārjitānām anuraktasarvaprakṛtīnāṁ pūrvaparākarāvantānūpavrajānartasurāṣṭraśva*................

Zu Zeile 11 bemerkt Lassen auf. S. 171 f.: Das Facsimile richtig *avaṁtyanūpa*, für *vraja* aber wie es scheint *ativraja*........

Zur Erklärung der Namen. *Avanti* ist Ujjayinī, wie bekannt; *Anūpa* aus *anvāpa* "Land längs dem Wasser" ist wohl die Küste Guzerat, das Wort ist sonst bekannt genug; *vraja* ist die Gegend um Mathurā; *ativraja* wäre das Land darüber hinaus;........

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